

INSECTS OF MICRONESIA

Diptera: Drosophilidae¹

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INTRODUCTION

This report covers relatively abundant material from the Mariana Islands, the principal high islands and most of the atolls of the Caroline Islands, many of the atolls of the Marshall Islands, as well as lesser collections from the Bonin and Gilbert Islands, Marcus, and Wake. No material was available from the Volcano Islands or from Nauru, and we have seen only a single specimen from Ocean Island. Though more than 5000 specimens of Drosophilidae have been studied, over half of these belong to the two most common and widespread species, *Drosophila ananassae* and *D. bryani*. The principal collectors were H. S. Dybas, H. K. Townes, R. J. Goss, N. L. H. Krauss, J. W. Beardsley, J. L. Gressitt, C. W. Sabrosky, F. M. Snyder, and M. R. Wheeler. Smaller collections were made by R. G. Oakley, P. A. Adams, R. W. L. Potts, G. E. Bohart, R. M. Bohart, T. Esaki, M. Wasserman, and others.

The United States Office of Naval Research, the Pacific Science Board (National Research Council), the National Science Foundation, Chicago Natural History Museum, and Bernice P. Bishop Museum have made this survey and the publication of the results possible. Field research was aided by a contract between the Office of Naval Research, Department of the Navy, and the National Academy of Sciences, NR 160-175. Field work in the Marshall Islands, Ponape, and Kapingamarangi Atoll, by members of the Genetics Foundation of the University of Texas during the summers of 1955-1959, was made possible by a contract with the United States Atomic Energy Commission and a grant from the Rockefeller Foundation.

The following symbols indicate the museums in which type specimens are stored: US (United States National Museum), CM (Chicago Natural His-

¹ This represents, in part, Results of Professor T. Esaki's Micronesian Expeditions (1936-1940), No. 124.

Distributional List of Micronesian Drosophilidae

	MICRONESIA ISLAND GROUPS													Other Localities	
	Caroline			Other Islands											
	Bonin	N. Mariana	S. Mariana	Palau	Vap	Caroline Atolls	Truk	Ponape	Kusaie	Marcus-Wake	Marshall	Gilbert	Ocean		
1. <i>Drosophila (Sophophora) melanogaster</i>	X									X	X			Cosmopolitan	
2. <i>D. (S.) takahashii</i>		X	X	X	X	X	X	X	X					Nepal, China, Taiwan, Japan	
3. <i>D. (S.) ananassae</i>	X	X	X	X	X	X	X	X	X		X	X	X	Australasian, Oriental, African and Neotropical regions	
4. <i>D. (S.) kikkawai</i>			X	X				X						Asia, Samoa, Hawaii, South America	
5. <i>D. (S.) pectinifera*</i>	X													Texas, Central and South America, Hawaii	
6. <i>D. (Drosophila) polychaeta</i>			X	X	X									Cosmopolitan	
7. <i>D. (D.) hydei</i>														Cosmopolitan	
8. <i>D. (D.) immigrans</i>			X		X									Southeast Asia, South Pacific, Hawaii, Seychelles	
9. <i>D. (D.) nasuta</i>										X				Philippines, Java, Sumatra	
10. <i>D. (D.) hypocausta</i>				X	X			X	X					China, Taiwan, Japan, Sumatra	
11. <i>D. (D.) annulipes</i>	X				X	X								Australia, Samoa, Philippines	
12. <i>D. (D.) fumifera*</i>					X	X								New Guinea, Sumatra	
13. <i>D. (D.) species a</i>						X	X	X	X					Worldwide	
14. <i>D. (Scaptodrosophila) bryani</i>			X	X	X	X	X	X	X		X	X		Java, Philippines, Solomon Is., Admiralty Is. Indonesia	
15. <i>D. (S.) palauana*</i>				X	X	X								Java, Fiji Is., Samoa, Solomon Is.	
16. <i>D. (S.) moenae*</i>															
17. <i>D. (S.) eluta*</i>															
18. <i>D. (S.) setifera*</i>															
19. <i>D. (S.) fuscopalpis*</i>															
20. <i>D. (S.) scaptomyzoidea</i>															
21. <i>D. (Hirtodrosophila) novicia*</i>	X			X											
22. <i>Drosophila species b</i>	X				X										
23. <i>Scaptomyza pallida</i>															
24. <i>Chaetodrosophilella quadrilineata</i>															
25. <i>Mycodrosophila amabilis</i>				X	X	X	X								
26. <i>M. gratiosa</i>				X	X	X	X								
27. <i>M. ponapeae*</i>									X						
28. <i>M. carola*</i>					X	X									
29. <i>M. gressitti*</i>															
30. <i>M. wassermani*</i>									X						

* Described as new.

Distributional List of Micronesian Drosophilidae

	MICRONESIA ISLAND GROUPS												Other Localities	
	Caroline													
	Bonin	N. Mariana	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Kusaie	Marcus-Wake	Marshall	Gilbert	Ocean	
31. <i>M. esakii</i> *														?Solomon Is. Indonesia, Taiwan
32. <i>Paramycodrosophila pictula</i>														
33. <i>P. parapictula</i> *														
34. <i>P. neopictula</i> *														
35. <i>P. species a</i>														
36. <i>Dettopsomyia formosa</i>														
37. <i>D. preciosa</i>														
38. <i>Neotanygastrella pacifica</i> *														
39. <i>N. species a</i>														
40. <i>N. species b</i>														
41. <i>Microdrosophila errator</i> *														
42. <i>M. pleurolineata</i> *														
43. <i>M. distincta</i> *														
44. <i>M. ochracella</i> *														
45. <i>M. species a</i>														
46. ? <i>Styloptera</i> species														
47. <i>Lisocephala metallescens</i>														
48. <i>L. sabroskyi</i> *														
49. <i>Liodrosophila nana</i> *														
50. <i>L. trukana</i> *														
51. <i>L. species a</i>														
52. <i>L. species b</i>														
53. <i>Leucophenga argentata</i>														
54. <i>L. halteropunctata</i>														
55. <i>L. limbipennis</i>														
56. <i>L. subpollinosa</i>														
57. <i>L. nigritrix</i>														
58. <i>L. boninensis</i> *														
59. <i>L. ponapensis</i> *														
60. <i>L. species a</i>														
61. <i>Stegana ornatipes</i> *														
62. <i>S. species a</i>														
63. <i>Cacoxenus lepidothrix</i> *														
64. <i>Calodrosophila</i> * <i>phalerosa</i> *														
65. <i>Nesiodrosophila</i> * <i>lindae</i> *														
66. <i>Baeodrosophila</i> * <i>pallens</i> *														
67. <i>B. pubescens</i> *														
68. <i>B. discolor</i> *														
69. <i>B. bicolor</i> *														

* Kapingamarangi Atoll only.

tory Museum), BISHOP (Bernice P. Bishop Museum), KU (Kyushu University), MCZ (Museum of Comparative Zoology), and TEX (University of Texas).

We wish to thank Dr. Sarah Pipkin for sending us examples of her collection from the Truk area and Dr. R. A. Harrison for the loan of type material of many Samoan species described by him. The original figures illustrating this report were made principally by the junior author, and were prepared for publication by Mrs. Linda Kuich.

ZOOGEOGRAPHY

The family Drosophilidae is well represented on most oceanic islands since the usual larval food sources, such as garbage, rotting fruits, mushrooms, or bleeding trees, are almost universally present. The family is widespread in Micronesia, as is shown by the accompanying distribution table, and absent only on the more northern, drier atolls of the Marshall Islands. Atolls, as expected, show far less variety than do the high islands and, with few exceptions, atoll species are not different from those of the nearest high islands.

We have identified 69 species of Drosophilidae from Micronesia, representing 17 genera. The 25 previously known species account for only 36 percent of the total; 64 percent (44) are new, but only 33 of these are being named as new species, however, as the remainder are represented mostly by single, poorly preserved specimens. The rather surprising number of new species, indicated by asterisks in the table, is largely explained by the fact that no major studies of the family in Micronesia have ever been attempted. Only 15 species have been previously reported from Micronesia—three of these are unidentified and one is a nondrosophilid according to present concepts (*Apstinota obscuripes* de Meijere, presently in the Diastatidae).

Only 28 (40 percent) of the 69 Micronesian species are known from outside this region, leaving 41 (60 percent) as solely Micronesian. In view of the proximity of Taiwan, Philippines, Indonesia, and New Guinea, all of which have been little studied but are known to possess a wealth of species, it seems probable that some of the Micronesian species will eventually be found in one or more of these rich adjacent regions.

By far the greatest variety of species occurs on Palau, with 40 species (58 percent of the total); more remarkable, however, is the fact that half of these are not known elsewhere. This high proportion of apparent endemism on Palau cannot be due entirely to more intensive collecting, although this factor is probably involved. Intensive collecting by *Drosophila* "specialists" has probably played a part in making Ponape the second most productive area, in terms of species collected; Ponape has 20 species (29 percent of the total), surpassing the 17 on Yap (24 percent), Truk has 11 (16 percent), and Kusaie 9

(13 percent). Expert collecting on the faunally poor atolls, however, did not appreciably increase the number of species; for example, in five consecutive summers of collecting in the Marshall Islands, only the same four species were taken by us each year.

Considerable endemism is indicated by the fact that 41 (60 percent) of the 69 Micronesian species are not known to occur elsewhere, and that 30 of these (43 percent of all Micronesian species) occur in only a single Micronesian region. Endemism, however, is not limited to the larger, more luxuriant islands; *Drosophila pectinifera* is apparently endemic on the Bonin Islands and *Paramycodrosophila neopictula* is known only from Kapingamarangi Atoll.

The geographic origins of the nonendemics seem fairly obvious; 16 of the 28 nonendemic species come from greater southeast Asia—Taiwan (Formosa), Indonesia, New Guinea, and other regions. Nine of the 28 are essentially worldwide, or at least circumtropical; it seems significant that four of the eight species from the Bonins belong to this category, and that two of the four were not found elsewhere in Micronesia.

Seven of the Micronesian genera are worldwide, and three others are nearly so. Three are strictly Asian, one is Afro-Asian, while three, described as new, appear to be Micronesian endemics. One of these, *Baeodrosophila*, is especially interesting, with two species on Palau, one on Yap, and one primarily on Guam, thus showing strong evidence of local, insular speciation.

SYSTEMATICS

The keys to genera and species are based almost entirely on adult characters since these are readily seen on the average preserved specimen. The male genitalia are especially useful, and we have illustrated them for all species of which we had males; fresh specimens may be dissected directly in a weak phenol solution, while older material requires prior boiling in 10 percent sodium or potassium hydroxide. The eggs often show group characters, and sometimes specific characters, but eggs are known for only a fraction of the Micronesian species. Figure 1 shows some representative eggs of species of *Drosophila*. Larvae are of little use in systematics; in fact, we can rarely distinguish them from larvae of other families of acalyprate flies. Puparia are useful only when standardized laboratory cultures of the flies are used.

The terminology used in the descriptions is largely patterned after that proposed by Sturtevant (1942, Univ. Texas Pub. 4213: 5-51). We have avoided abbreviations for the most part, the following being the ones routinely employed:

C-index: costal index, the length of the second costal section divided by the third, measured as straight lines from the extremities; *4-index*: fourth vein

index, the length of that portion of the vein between the anterior and posterior cross veins divided by the portion distad of the posterior cross vein; *C3 fringe*: the portion of the third costal section covered by the heavier, darker, costal fringe. The number of branches of the arista is expressed as the arista formula (4/2, for example), interpreted as the number of branches above the main axis and the number below the axis, both excluding the terminal fork.

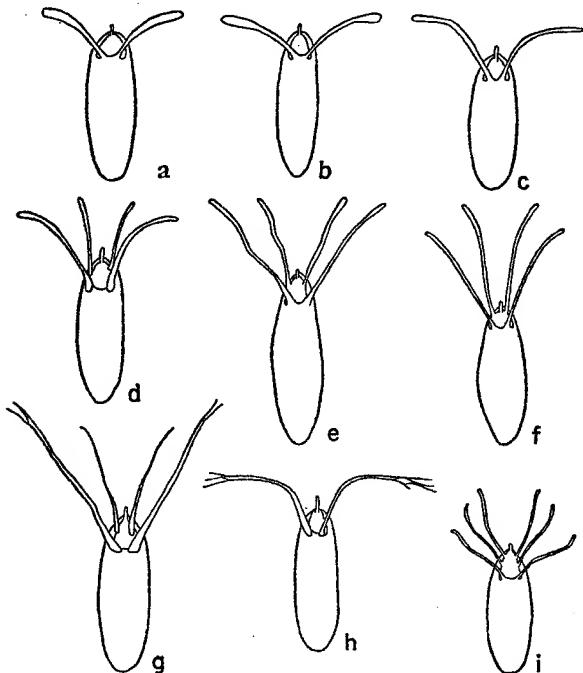


FIGURE 1.—Eggs: a, *Drosophila melanogaster*; b, *D. ananassae*; c, *D. kikkawai*; d, *D. hydei*; e, *D. polychaeta*; f, *D. immigrans*; g, *D. nasuta*; h, *D. hypocausta*; i, *D. bryani*.

KEY TO MICRONESIAN GENERA OF DROSOPHILIDAE

1. Costa deeply incised at end of first vein, costa protruding as a thickened, blackened lappet (fig. 15)..... 2
- Distal costal break normal, costa not forming a lappet..... 6
- 2(1). Only posterior dorsocentrals present; scutellum velvety..... *Mycodrosophila* (part) 3
- Two or more pairs of dorsocentrals; scutellum not velvety..... 3
- 3(2). Two pairs of dorsocentrals; ocellars arising within triangle formed by the three ocelli..... 4
- Three pairs of dorsocentrals; ocellars arising outside ocellar triangle..... *Styloptera* (?)

4(3). Anterior dorsocentrals relatively near posterior ones; carina small, narrow; hind tibia with a stout bristle about one-third from base on outer side *Paramycodrosophila*

Anterior dorsocentrals far forward, at or near transverse suture; carina normal or very large; hind tibia without such a bristle 5

5(4). Apical scutellars cruciate; carina very large, antennal bases far apart; acrostichals in two to four rows; anterior reclinate orbital bristle large *Dettopsomyia*

Apical scutellars divergent; carina normal; acrostichals in about eight rows; anterior reclinate small to minute *Microdrosophila* (part)

6(1). With well-developed prescutellar bristles 7

Without well-developed prescutellars 10

7(6). Arista pubescent, with only short hairs *Cacoxenus*

Arista plumose, with long dorsal and ventral branches 8

8(7). Postvertical bristles small; acrostichal hairs in 10 or more rows; third costal section with a series of small, wartlike spines; posterior reclinate orbital closer to inner vertical than to proclinate 9

Postverticals normal; acrostichal hairs in six to eight rows; third costal section without wartlike bristles; posterior reclinate orbital closer to proclinate than to inner vertical *Drosophila* (part)

9(8). Third and fourth veins strongly converging apically; costa reaching apex of fourth vein; mid tibia with a row of strong bristles along its outer edge *Stegana*

Third and fourth veins converging slightly or not at all; costa reaching only to apex of third vein; mid tibia with weak bristles or none *Leucophenga*

10(6). Arista clearly plumose, with several long dorsal branches and one or more ventral branches, the main axis forked apically 11

Arista pubescent or with a few stubby branches, main axis somewhat pubescent apically, not forked (fig. 27) *Baeodrosophila*

11(10). Ocellar bristles placed beside anterior ocellus, clearly outside ocellar triangle 12

Ocellars behind anterior ocellus, within ocellar triangle 13

12(11). Face flat; anterior reclinate orbital rather large, beside proclinate; mid and hind tarsi of male very bristly *Nesiodrosophila*

Face weakly carinate above; orbita rather far apart, anterior reclinate small; tarsi not bristly *Calodrosophila*

13(11). Acrostichal hairs in two to four rows 14

Acrostichals in six or more rows 16

14(13). With three to four pairs of dorsocentrals *Chaetodrosophilella*

With only two pairs of dorsocentrals 15

15(14). Scutellum velvety; mesonotum shining, metallic; fore femur with a row of short stout teeth on inner side *Liodrosophila* (part)

Scutellum and mesonotum dull; fore femur unarmed *Scaptomyza*

16(13). Frons highly polished; scutellum velvety; often with metallic colors on thorax and abdomen 17

Frons dull to subshining, usually only orbits shiny; scutellum rarely velvety; usually without metallic colors 18

17(16). Entire frons highly polished; scutellum tan to brown; wings typically with a dark diagonal stripe near base *Lissoccephala*

Shiny orbits separated from central part of frons by narrow, usually dull, lines; scutellum usually black; wings without basal stripe *Liodrosophila* (part)

18(16). Apical scutellars divergent; anterior dorsocentral placed far anteriorly, at or near transverse suture..... *Microdrosophila* (part)
 Apical scutellars cruciate; anterior dorsocentrals rather near posterior ones or absent 19

19(18). Anterior dorsocentral absent; scutellum velvety..... *Mycodrosophila* (part)
 Anterior dorsocentrals present; scutellum not velvety 20

20(19). Occiput often with strong whitish pollinosity; carina forming an enlarged bulbous mound near oral margin; anterior reclinate orbital beside or in front of proclinate; postverticals sometimes minute..... *Neotanygastrella*
 Occiput not pruinose; carina not moundlike below; anterior reclinate orbital usually behind proclinate; postverticals normal.... *Drosophila* (part)

Genus *Drosophila* Fallén

Drosophila Fallén, 1823, Geomyzides Sveciae 2: 4 (type: *Musca funebris* Fabricius; Sweden).

Acrostichal hairs in six or more rows; arista plumose, with one or more ventral branches and a terminal fork; one proclinate and two reclinate orbital bristles, anterior reclinate smaller than other two, posterior reclinate nearer proclinate than inner vertical; postvertical bristles well developed.

This is one of the largest genera of insects, with about 1,000 described species. Four of the approximately 15 subgenera are represented in the Micronesian material.

KEY TO MICRONESIAN SPECIES OF *DROSOPHILA*

1. Prescutellar acrostichal bristles developed; a small propleural bristle present 16
 No prescutellars or propleurals 2

2(1). Antennal segment 3 large, clothed with long hairs; arista with a single ventral branch basal to terminal fork; carina small, confined to upper part of face..... 11
 Antennal segment 3 of normal size; arista with two or more ventral branches; carina usually prominent..... 3

3(2). Inner surface of fore femur in both sexes with a row of short, stout, black teeth 4
 Front femur unarmed..... 7

Subgenus *Drosophila*

4(3). Mesonotum and pleura with dark longitudinal stripes; legs banded; basal scutellars divergent 11. *annulipes*
 Without longitudinal stripes or banded legs; basal scutellars convergent..... 5

5(4). Apices of long veins clouded; first basitarsus of male short, thick, with dense short hairs; C-index 4.4; C3 fringe on basal one-fourth.....8. *immigrans*
 Wings not noticeably clouded; male first basitarsus normal; C-index below 4.0; C3 fringe on basal one-half.....6

6(5). Femoral teeth relatively weak; female abdomen with weak bands, and pleura and legs pale; male with black abdomen, pleura, femora, and coxae; frons not pruinose.....10. *hypocausta*
 Femoral teeth strong; abdominal pattern reduced on both sexes; pleura and legs pale; male frons strongly whitish pruinose when viewed from certain angles.....9. *nasuta*

7(3). Mesonotum spotted, each hair and bristle arising from a dark spot.....7. *hydei*
 Mesonotum without spotted pattern.....8

8(7). With one or two extra dorsocentral bristles just anterior to usual ones; C3 fringe on basal nine-tenths.....6. *polychaeta*
 No extra dorsocentrals; C3 fringe on basal three-fourths or less.....9

9(8). Basitarsus of first leg of male with a row of stout black teeth, or with transverse rows of stiff hairs; C-index 1.5-2.5.....12
 Male first basitarsus without teeth; C-index 2.8 or more.....10

10(9). C-index 4.0; C3 fringe on basal one-half; frons whitish pruinose when viewed from certain angles; wings somewhat darkened.....13. *species a*
 C-index 2.8; C3 fringe on basal three-fourths; frons not pruinose; wings quite dark.....12. *fumifera*

Subgenus *Hirtodrosophila*

11(2). Abdominal bands diffuse, becoming progressively paler on the posterior tergites; C3 fringe on basal four-fifths.....21. *novicia*
 Abdominal bands becoming increasingly blacker on posterior tergites; C3 fringe on basal five-sixths.....22. *species b*

Subgenus *Sophophora*

12(9). Dull yellow species; abdomen without pattern; C-index about 1.5; male first basitarsus with four to six transverse rows of stiff yellowish to brownish hairs, segment 2 with two to three such rows.....3. *ananassae*
 Abdominal tergites with apical bands; C-index 1.8 or more.....13

13(12). Male first basitarsus with a row of 25 or more stout black teeth, segment 2 with a row of 18 or more such teeth; marginal bristles of tergites unusually stout.....14
 Male first basitarsus with a row of about 10 teeth or with transverse rows of stiff hairs, segment 2 never with teeth; bristles of tergites normal.....15

14(13). Palpi pale; C-index 2.1; C3 fringe on basal one-half; male first basitarsus with a row of about 25 black teeth, segment 2 with about 18 teeth.....4. *kikkawai*
 Palpi dark; C-index 2.5; C3 fringe on basal three-fifths; male first basitarsus with a dense row of about 37 compact brown teeth plus 14 stout black teeth, segment 2 with a curved row of about 50 compact brown teeth.....5. *pectinifera*

15(13). Male first basitarsus with a row of about 10 stout black teeth; male abdomen black apically, female abdomen with blackish apical bands.....
.....1. *melanogaster*
Male first basitarsus with two to three transverse rows of stiff brownish hairs, segment 2 with one to two such rows; male abdomen darker apically, female abdominal pattern usually greatly reduced.....2. *takahashii*

Subgenus Scaptodrosophila

16(1). Basal scutellars convergent, about half length of apicals; C-index about 1.5; C3 fringe on basal three-fourths.....14. *bryani*
Basal scutellars divergent, nearly equaling apicals in length.....17
17(16). C-index 4.3; C3 fringe on basal one-half.....20. *scaptomyzoidea*
C-index less than 2.5.....18
18(17). Mesonotum light brown to tan with diffuse narrow darker longitudinal stripes, those of acrostichal region most pronounced.....17. *eluta*
Mesonotum without evident longitudinal stripes.....19
19(18). Abdomen mostly pale, bands, if evident, becoming increasingly paler on posterior segments.....20
Abdomen darker, with prominent bands or with bands becoming increasingly darker on posterior segments.....21
20(19). Palpi dark; arista with three ventral branches; posterior sternopleural strong, other two weak.....19. *fuscopalpis*
Palpi pale; arista with two ventral branches; three strong sternopleurals.....15. *palauana*
21(19). Mesonotum tan, pleura a little darker; abdomen of both sexes becoming increasingly darker posteriorly; palpi pale.....18. *setifera*
Mesonotum light brown, pleura of female tan, of male dark brown to black; palpi brown; male abdomen largely black, female with distinct apical bands, broadly expanded in middle to give the appearance of a broad median longitudinal stripe.....16. *moenae*

Subgenus Sophophora Sturtevant

Sophophora Sturtevant, 1939, National Acad. Sci., Proc. 25: 139 (type: *Drosophila melanogaster* Meigen).

Dark bands of abdominal tergites, when present, not medianly interrupted; eggs with two filaments; cheeks relatively narrow; no prescutellar acrostichal bristles; no propleural bristle.

1. *Drosophila melanogaster* Meigen (fig. 2, a-d).

Drosophila melanogaster Meigen, 1830, Syst. Beschreib. 6: 85 (Europe; type unknown).

Drosophila ampelophila Loew, 1862, Berliner Ent. Zeitschr. 6: 231.

Drosophila uvarum Rondani, 1875, Soc. Ent. Ital., Bull. 8: 86.

Tan to reddish-yellow species with darker abdominal bands. *Arista* 5/2; anterior recline orbital about one-third length of other two; two orals; carina rather broad, flat. Acrostichals in about eight rows; basal scutellars convergent. *Mesonotum* and scutellum shiny reddish yellow; pleura and legs pale. Anterior sternopleural half

length of posterior. Fore tarsus of male with sexcomb of about 10 short black teeth on inner distal surface of basitarsus. Abdominal tergites of male yellow basally, with blackish apical bands, broader in middle, the more posterior tergites becoming wholly black; tergites of female with dark apical bands on all segments. Wings hyaline; C-index 2.2; 4-index 2.4; C3 fringe on basal one-third. Body length about 2.0 mm., female larger.

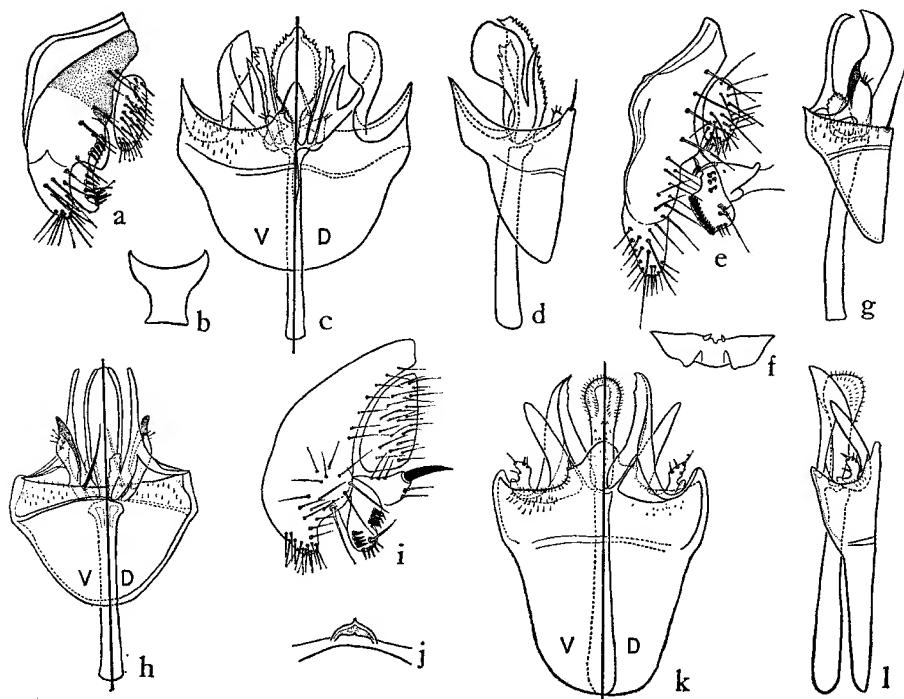


FIGURE 2.—Male genitalia: a-d, *Drosophila melanogaster*; e-h, *D. takahashii*; i-l, *D. ananassae*. (Shown are: a, e, i, genital arch and clasper; b, f, j, bridge connecting claspers; c, h, k, copulatory apparatus, ventral (V) and dorsal (D) views; d, g, l, copulatory apparatus, lateral view.)

This species has been termed the best known insect in the world, because of its extensive use over the last half century in genetics, insect physiology, and other studies. It is rarely found in wild habitats, but is usually associated with human garbage.

DISTRIBUTION: Worldwide, in both tropical and temperate regions.

BONIN IS. CHICHI JIMA: Many, Omura, four, Okumura, Apr.-June 1958, Snyder. **HAHA JIMA:** Nine, Okimura, Apr.-May 1958, Snyder. **OTOTO JIMA:** One, Kammuri-iwa, June 1958, Snyder and Mitchell.

S. MARIANA IS. GUAM: Reported present by Bohart and Gressitt (1951).

PALAU. KOROR: One, NE. corner, July 1946, Townes.

TRUK. WENA (Moen), TOL, DUBLON, UMAN, Sept. 1951-Oct. 1952, Pipkin (1956).

PONAPE. Colonia: Few, Aug. 1959, Wheeler and Wasserman.

MARCUS I. Reported present by Sakagami (1953).

MARSHALL IS. MAJURO: Few, Uliga I., July 1956, Wheeler; July 1959, Wheeler and Wasserman.

2. *Drosophila takahashii* Sturtevant (fig. 2, *e-h*).

Drosophila takahashii Sturtevant, 1927, Philippine Jour. Sci. 32: 371 (Taiwan; type in American Museum of Natural History).

Arista 4/3; front, face, antennae, and cheeks brownish yellow; two nearly equal oral bristles; anterior reclinate orbital about one-fourth length of other two. Carina rather low and flat. Acrostichal hairs in eight rows; no prescutellars; basal scutellars convergent. *Mesonotum* and scutellum subshining, somewhat reddish tan to reddish yellow; pleura and legs pale. Undersurface of first basitarsus of male with about six short transverse rows of short, stiff, black hairs, and with two such rows on segment 2.

Abdomen subshining black, the basal three or four segments with paler yellow basal areas. *Wings* clear; C-index 2.3; 4-index 2.6; C3 fringe on basal two-fifths. Body length about 2.0 mm. Eggs have two slender filaments, thicker and somewhat flattened apically; the eggs described and figured by Bohart and Gressitt (1951: 94 and pl. 1) for *takahashii* must belong to some other species as they have four filaments.

DISTRIBUTION: China, Nepal, Taiwan, Japan, Mariana Is.

S. MARIANA IS. GUAM: Recorded by Bohart and Gressitt (1951), the identification being credited to Dr. A. H. Sturtevant.

The reported presence of this species in Australia by Mather (1955, Australian Jour. Zool. 3: 568) was later shown to be an error, this species being described by Mather (1957, Univ. Texas Pub. 5721: 222) as *D. pseudotakahashii*.

3. *Drosophila ananassae* Doleschall (fig. 2, *i-l*).

Drosophila ananassae Doleschall, 1858, Nat. Tijd. Ned. Ind. 17: 128 (Amboina, Indonesia; type unknown).

Drosophila similis Lamb, 1914, Linn. Soc. London (Zool.) Trans. II, 16: 347 [Seychelles; type in British Museum (N.H.)].

Drosophila errans Malloch, 1933, B. P. Bishop Mus., Bull. 114: 21 (*nom. nov.* for *similis* Lamb, *nec* Williston).

A dull yellowish species with reduced abdominal pattern. *Arista* 4/2; anterior reclinate orbital about one-third other two; two orals, second weaker; carina rather broad, flat. Acrostichal hairs in eight rows; basal scutellars convergent. *Mesonotum* and scutellum dull pale tannish yellow; pleura and legs pale. Anterior sternopleural half length of posterior. Tarsal segments 1 and 2 of fore leg of male with numerous transverse rows of dense short brownish bristles ventrally, apparent only from certain

angles. *Abdomen* brownish yellow, dull, usually without any evident darker banding, sometimes with indistinct brownish posterior margins. *Wings* hyaline; C-index 1.5; 4-index 2.4; C3 fringe on basal one-half. Body length about 2.0 mm.

DISTRIBUTION: Widespread in Oriental, Australasian, Neotropical, and Ethiopian regions, rare in Nearctic areas.

BONIN IS. CHICHI JIMA: One, Sakai-ura, May 1958, Snyder and Mitchell.

N. MARIANA IS. AGRIHAN: Four, Aug. 1945, Borror and Holder.

S. MARIANA IS. SAIPAN: Many, Donni-Tarahoho, Matansha-Calabera, Garapan, May-July 1939, Esaki; two, E. Tanapag, Oct. 1945, Dybas. GUAM: Many, from numerous localities: Piti, Mt. Santa Rosa, Haputo Pt., Yona, Mt. Bolanos, Merizo, Asan, Pt. Oca, Pt. Ritidian, Barrigada, Mt. Alifan, Pilgo River, collected by Gressitt, Swezey, G. E. Bohart, Maehler, Krauss, Oakley, Dybas, and Usinger.

PALAU. NGAIANGL: Seven, May 1957, Sabrosky; three, Dec. 1952, Gressitt. BABELTHUAP: Many from several localities, Ngiwal, E. Ngatpang, Ngere-helong, Ngaremenglui, Melekeiok, Ulimang, by Gressitt, Sabrosky, Dybas. NGERKABESANG: one, May 1957, Sabrosky. KOROR: Many, Krauss, Beardsley, McDaniel, Sabrosky, Gressitt. NGARMAK (NW Auluptagel): Two, Dec. 1952, Gressitt.

YAP. YAP: Many, Gressitt, Krauss, Sabrosky; Dugor and Tomil, Goss. RUMUNG: Many, Sabrosky, Esaki.

CAROLINE ATOLLS. SOROL: One, Oct. 1952, Krauss. SONSOROL: Seven, Sept. 1952, Krauss. NOMWIN: Three, Feb. 1954, Beardsley. NAMA: One, Oct. 1952, Beardsley. TOBI: One, Sept. 1952, Krauss. FAIS: 13, Oct. 1952, Krauss. MOKIL: Five, Jan. 1953, Gressitt. NGULU: Many, Oct. 1952, Krauss. WOLEAI: Many, July 1946, Townes; Sept. 1952, Krauss. ELATO: Two, Sept. 1952, Krauss. PULO ANNA: One, Sept. 1952, Krauss. ULITHI: Two, Oct. 1952, Krauss. IFALUK: Many, Aug.-Sept. 1953, Bates. KAPING-AMARANGI: Many, July-Aug. 1954, Niering; Aug. 1946, Townes; July 1956, Aug. 1959, Wheeler. Reported from Faraulep, Satawal, and Ifaluk by Pipkin (1952, *Drosophila Information Service*, p. 117).

TRUK: TOLOAS: One, July 1939, Esaki. TON (Tol): One, Mt. Unibot, May 1946, Townes. WENA (Moen): Many, Feb. 1948, Maehler; July 1946, Townes; Mt. Teroken, Feb. 1953, Gressitt; Civ. Ad. Area, Mar. 1949, Potts; S. valley, Mt. Tonaachau, Feb.-Mar. 1949, Potts.

PONAPE. Colonia, many, Jan. 1938, July 1939, Esaki; June-Sept. 1950, Adams; many thousands, 1955-1959, Wheeler and others.

KUSAIE. Lele (Lelo), seven, Malem, one, Mwot-Utwe, Esaki; one, Aug. 1946, Oakley; Mt. Matante (Buache), Townes; Mt. Fuinkol, Gressitt; Mataluk, Gressitt, Clarke; Fuinwukat, Clarke.

MARSHALL IS. MAJURO: Two, Nov. 1953, Beardsley; many thousands, 1955-1959, Wheeler and others. ARNO: Many, May-Aug. 1950, La Rivers;

June 1950, Usinger. BIKINI: Many, 1955-1958, Wheeler and others. RONGELAP: Many, 1955-1959, Wheeler and others. RONGERIK: Few, 1955-1958, Wheeler and others. UJELANG: Few, July 1959, Wheeler. NAMORIK: Many, Sept. 1953, Beardsley. MILI: Eight, Oct. 1953, Beardsley. AILINGLAPALAP: Eight, Oct. 1953, Beardsley. UJAE: One, Oct. 1953, Beardsley. NAMU: One, Oct. 1953, Beardsley. JALUIT: 13, Imrodj I., Aug. 1946, Townes.

GILBERT IS. TARAWA: Many, Eret, Dec. 1957, Krauss; Bikenibeu, Nov. 1957, Krauss; Bairiki, Nov. 1957, Krauss. BUTARITARI: Dec. 1957, Krauss. OCEAN I. One, Dec. 1957, Krauss.

This is by far the most common and most widespread species of *Drosophila* in Micronesia, often found by the thousands around fallen breadfruit, papaya, *Pandanus*, and *Morinda* fruits.

4. *Drosophila kikkawai* Burla (fig. 3, *a-d*).

Drosophila kikkawai Burla, 1954, Rev. Brasil. Biol. 14: 47 (types not reported).

Drosophila montium auct., *nec de Meijere*.

Arista 4/2-3; frons and face yellow; antennae brownish, segment 3 darker; anterior reclinate orbital one-third length of other two; two nearly equal oral bristles. Carina narrow and flat. Palpi with a single stout apical bristle. Acrostichal hairs in six rows; no prescutellars; basal scutellars convergent. *Mesonotum* and scutellum rather shiny, dark yellowish to tan; pleura and legs pale. Inner surface of first basitarsus of male with a prominent comblike row of about 25 stout black teeth, segment 2 with a similar row of about 18 teeth.

Abdomen usually shining yellow, tergites with blackish apical bands, but often paler posteriorly; in some parts of the distribution the abdomen is much darker. Some stout bristles on posterior margin of tergites, especially on posterior ones. *Wings* clear; C-index about 2.1; 4-index 2.5; C3 fringe on basal half. Body length about 2.0 mm. Eggs with two slender filaments.

DISTRIBUTION: China, Nepal, Japan, Hawaii, Micronesia, Samoa, South America.

S. MARIANA IS. GUAM: One, Potts Junction, Oct. 1952, Krauss; one, June 1939, Oakley; also recorded by Bohart and Gressitt (1951).

PALAU. NGAIANGL: Two, May 1957, Sabrosky. BABELTHUAP, KOROR: Reported (as *bipectinata*) by Pipkin (1952, *Drosophila* Information Service, p. 117).

PONAPE. Colonia and Agric. Expt. Sta., Aug. 1956, Wheeler; Aug. 1959, Wheeler and Wasserman.

5. *Drosophila pectinifera* Wheeler and Takada, n. sp. (fig. 3, *e-j*).

Arista 4/3; frons tan, orbits and ocellar triangle paler and rather shiny, triangle continued anteriorly to lunule. Proclinate and posterior reclinate orbitals subequal; anterior reclinate quite small. Antennae dark tan. Face rather narrow, pale yellowish, more whitish on males. Second oral bristle slightly more than half length of first. Cheeks pale, narrow; clypeus and palpi brown, the latter with a single stout apical bristle; proboscis pale.

Mesonotum tan to light brown, subshining; acrostichal hairs in six rows; no pre-scutellars. Scutellum rather flat; basal scutellars divergent on most specimens. Pleura pale, more tan above on some individuals. Legs pale; preapicals on all tibiae, apicals on first and second. Fore tarsi of males with prominent sex combs (fig. 3, *i*): basitarsus with a dense comb of about 37 brown thick teeth, set extremely close together,

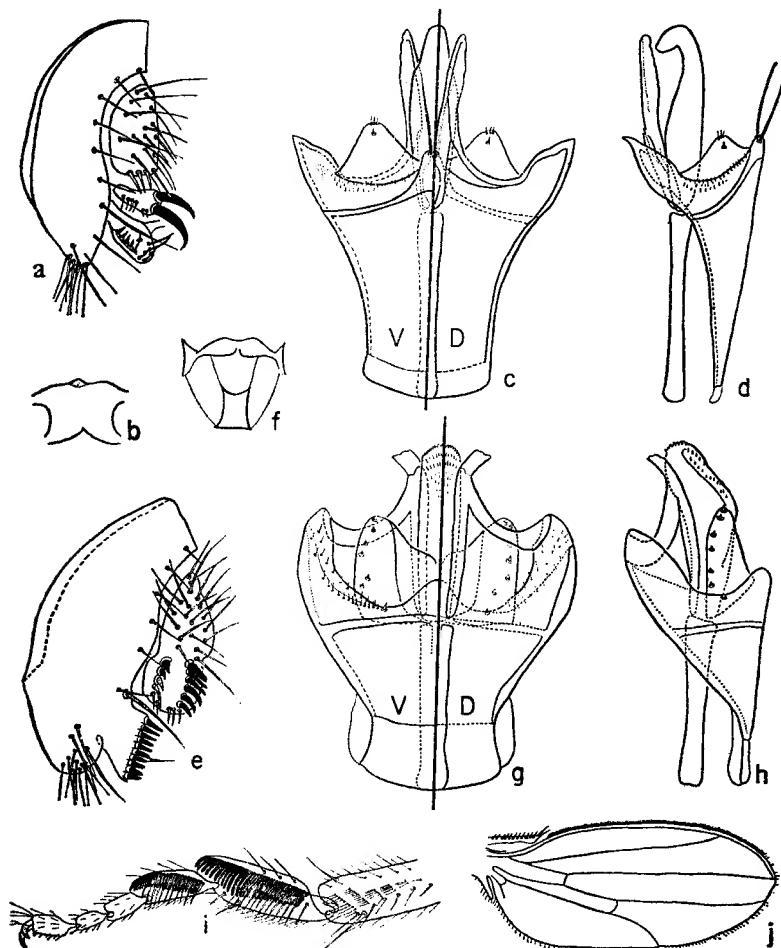


FIGURE 3.—a-d, *Drosophila kikkawai*, male genitalia. e-h, *D. pectinifera*: e-h, male genitalia; *i*, sex comb of male fore tarsus; *j*, wing. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

continuous apically with a row of about 14 black stout teeth, more loosely set; segment 2 with a slightly curved row of about 50 brown teeth, very closely set; near free ends of teeth of both closely set rows is a sparse row of thin longer bristles.

Abdomen rather shiny, yellowish tan with blackish apical bands thicker in middle; tergite 6 sometimes darker, sometimes paler than tergites 2 to 5. Apical bristles of

posterior tergites stout, more numerous on female. *Wings* dusky; C3 fringe on basal 0.6-0.75; C-index 2.3-2.5; 4-index about 2.9-3.0. Body length about 2.2 mm. (male), up to 3.0 mm. (female).

Holotype, male (US 67343), allotype, female (US), Chichi Jima, Omura, Bonin Is., May 5-June 9, 1958, Snyder. Paratypes (BISHOP, US), all Bonin Is.: Four males, four females, Chichi Jima, Omura, May 5-June 9, 1958; male, female, Chichi Jima, Miyano-hama, Apr. 15-21, 1958; female, Chichi Jima, Sakai-ura, May 12-31, 1958; all by Snyder. Male, three females, Haha Jima, Okimura, Apr. 26-May 9, 1958, Snyder.

DISTRIBUTION: Bonin Is. (Chichi Jima, Haha Jima).

The species appears to belong to the *melanogaster* species group, showing similarities to *kikkawai*, *auraria*, *rufa*, and *montium*.

Subgenus *Drosophila* s. str.

Dark bands of abdominal tergites, when present, interrupted medianly, at least on basal segments; eggs usually with four filaments, rarely with fewer; cheeks often relatively broad; prescutellar acrostichal bristles usually undeveloped; propleural bristle absent.

6. *Drosophila polychaeta* Patterson and Wheeler (fig. 4, *a-d*).

Drosophila polychaeta Patterson and Wheeler, 1942, Univ. Texas Pub. 4213: 102 (Texas; type in American Museum of Natural History).

Arista 5/2; frons yellowish brown; anterior reclinate orbital half length of proclinate and one-third length of posterior reclinate. Second oral scarcely half length of first. Carina broad below, not sulcate; face brownish, cheeks paler, broad. Acrostichal hairs irregular, basically in eight rows; no prescutellars. Basal scutellars convergent. *Thorax* tannish brown, subshining. With an extra dorsocentral bristle anterior to the usual ones, and usually with one or two additional enlarged hairs in the same row. Legs yellowish. *Abdomen* grayish brown, rather uniformly so in younger flies, but the tergites darker posteriorly on older specimens.

Wings slightly dusky; C3 fringe on the basal 0.9; C-index about 2.0; 4-index 2.2. Body length about 2.8 mm. (male), 3.5 mm. (female). Eggs with four long thin filaments.

DISTRIBUTION: Central and South America, Texas, Hawaii, S. Mari-ana Is., Caroline Is.

S. MARIANA IS. SAIPAN: One, As Mahetog, Dec. 1944, Dybas. GUAM: One, June 1939, Oakley.

PALAU. KOROR: One, July 1946, Townes.

YAP. YAP: Five, Kolonia, June 1957, Sabrosky.

7. *Drosophila hydei* Sturtevant (fig. 4, *e-h*).

Drosophila hydei Sturtevant, 1921, Carnegie Inst. Washington, Pub. 301: 101 (Florida; type in American Museum of Natural History).

Arista 3-4/2; frons brown, orbits pollinose, black around bases of orbital bristles. Anterior reclinate orbital one-third length of other two; vibrissa nearly twice length of second oral; carina broad below, sulcate. Cheeks rather broad, grayish yellow. Acrostichal hairs in eight rows; no prescutellars, although hairs in this position may be a little enlarged; basal scutellars convergent. Mesonotum grayish brown, each hair

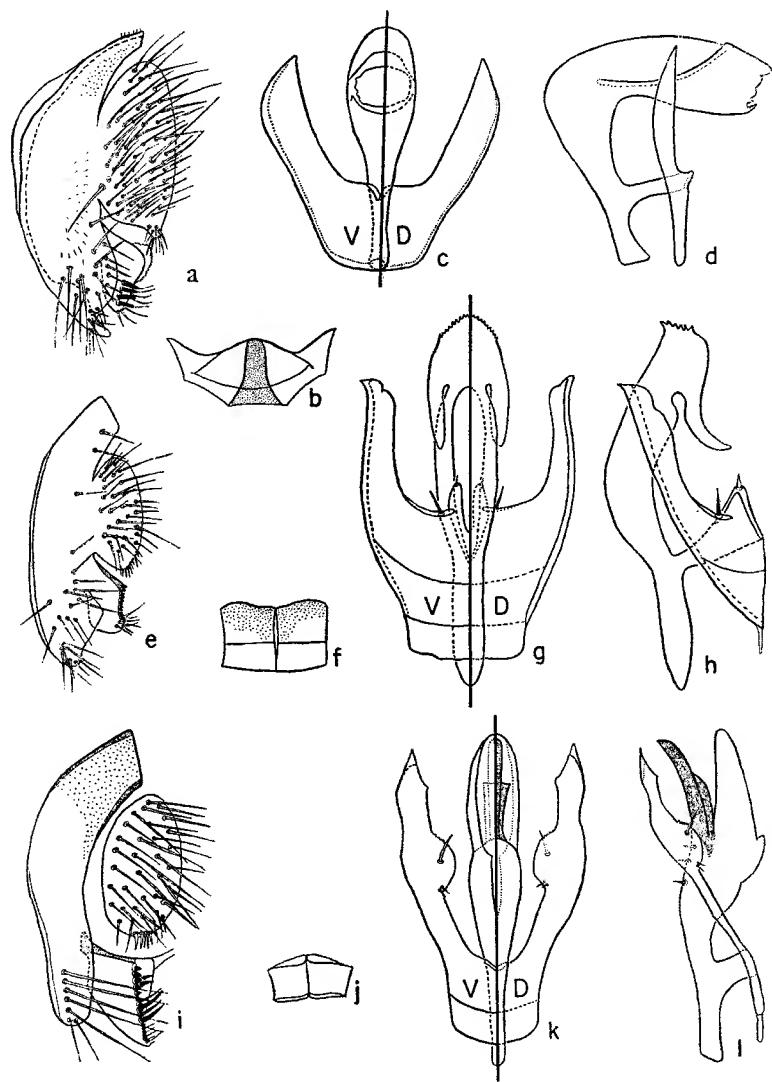


FIGURE 4.—Male genitalia: a-d, *Drosophila polychaeta*; e-h, *D. hydei*; i-l, *D. immigrans*. (Shown are genital arch and clasper, bridge connecting claspers, copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

and bristle arising from a darker-brown spot. Legs grayish yellow, fore coxae not darker; tibiae with darker basal and apical bands, darkest on hind legs; fore tarsi of male with some prominent recurved hairs.

Abdominal tergites with large dark-brown apical bands, broadly interrupted at middle, widening at angle of tergites to form solid lateral areas. *Wings* hyaline; C-index 3.4; 4-index 1.6; C3 fringe on basal half. Body length about 3.0 mm. (male), 3.4 mm. (female). Eggs have four tapering filaments.

DISTRIBUTION: Cosmopolitan, often associated with garbage.

WAKE I. One, Peale I., July 1940, Lyons.

8. ***Drosophila immigrans* Sturtevant (fig. 4, *i-l*).**

Drosophila immigrans Sturtevant, 1921, Carnegie Inst. Washington, Pub. 301: 83 (New York; type in American Museum of Natural History).

Drosophila brouni Hutton, 1901, Roy. Soc. New Zealand, Trans. 79: 514 (name suppressed, Opinion 396, Int. Comm. Zool. Nomen.).

Arista 6/3-4; frons yellow with an orange cast, ocellar area darker; anterior reclinate orbital about one-fourth length of other two; second oral bristle more than half length of first; carina broad and flat; face and cheeks yellow, the latter broad. Acrostichal hairs in eight rows; no prescutellars; basal scutellars convergent. *Mesonotum* and scutellum dull tannish-yellow, pleura and legs pale yellow. Inner surface of fore femur of both sexes with a row of short black teeth; fore basitarsus of male shortened and fuzzy, bearing a dense cluster of fine hairs.

Abdomen dull, yellowish, with medianly interrupted blackish apical bands; on male, bands become more extensive on posterior tergites, last one being all black; on female, increasing size of bands posteriorly is less obvious, usually all tergites having interrupted bands. *Wings* lightly clouded over posterior cross vein and at apices of longitudinal veins; C-index about 4.4; 4-index about 1.2; C3 fringe on basal one-fourth or a trifle more. Body length 3.0 mm., females often larger. Eggs with four filaments. Posterior spiracles of larva and puparium black.

DISTRIBUTION: Cosmopolitan.

BONIN IS. HAHA JIMA: 30, Okimura, Apr.-May 1958, Snyder.

9. ***Drosophila nasuta* Lamb (fig. 5, *a-d*).**

Drosophila nasuta Lamb, 1914, Linn. Soc. London, Trans. 16: 346 [Seychelles; type in British Museum (N.H.)].

Drosophila sulfurigaster Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 48 (New Guinea; type in Budapest, destroyed ?).

Drosophila albomicans Duda, 1924, Archiv Naturgesch. A, 90 (3): 209, 245 (Formosa, New Guinea; type in Budapest, destroyed ?).

Drosophila albovittata Duda, 1926, Suppl. Ent. 14: 83, 87 (improper replacement name for *sulfurigaster* Duda).

Drosophila bilimbata Bezzi, 1928, Diptera Brachycera, Fiji: 159 (Fiji Is.; type ?).

Spinulophila nasuta, Malloch, 1934, Insects of Samoa, 6 (8): 311.

Drosophila spinofemora Patterson and Wheeler, 1942, Univ. Texas Pub. 4213: 104 (Hawaii; type in American Museum of Natural History).

Drosophila nasuta, Harrison, 1954, Roy. Ent. Soc. London, Trans. 105 (6): 107.

Arista 6/3; frons yellowish tan, that of male strongly whitish pruinose, especially on orbits when viewed from certain angles, female frons only slightly pruinose. Anterior reclinate orbital half length of proclinate, one-third length of posterior reclinate. Second oral bristle more than half length of first; palpi pale; carina broad below, rounded, not sulcate. Cheeks pale, relatively narrow.

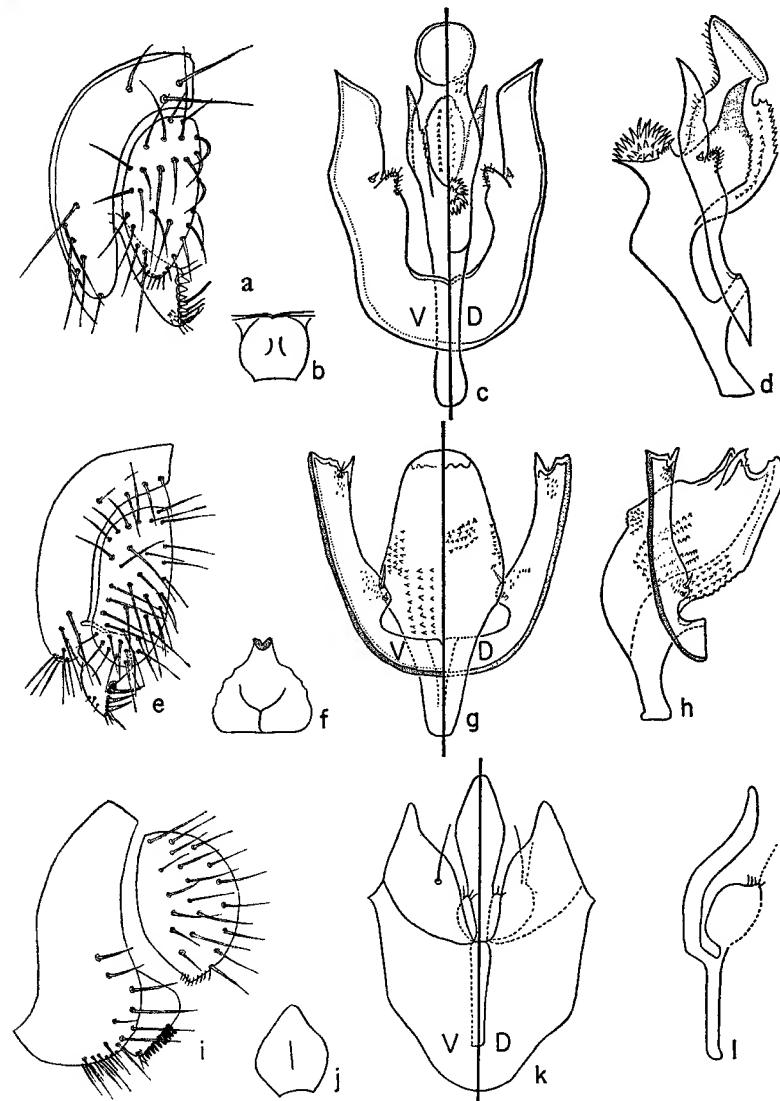


FIGURE 5.—Male genitalia: a-d, *Drosophila nasuta*; e-h, *D. hypocausta*; i-l, *D. anulipes* (redrawn from Okada). (Shown are genital arch and clasper, bridge connecting claspers, copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

Acrostichal hairs in eight rows; no prescutellar; basal scutellars convergent. *Mesonotum* amber to tan, dull. Legs pale; inner surface of fore femora of both sexes with a row of short, stout, black teeth; fore basitarsus of male normal; basitarsus of middle leg on both sexes with a short, black, erect spine ventrally near base.

Abdomen pale tan, with very faint darker apical bands which are vaguely interrupted medianly and fade away entirely laterally. *Wings* slightly dusky, faintly darkened over cross veins. C-index 3.4-3.7; 4-index 1.4-1.5; C3 fringe on basal half. Body length about 3.0 mm. Eggs with four filaments, anterior pair thin, posterior pair thicker and with tips sometimes curled or branched.

DISTRIBUTION: Widespread in southeast Asia; south Pacific; Hawaii; Seychelles.

S. MARIANA IS. GUAM: Two, Mt. Alifan, Oct. 1957, Krauss.

YAP. YAP: One, Dugor, July-Aug. 1950, Goss; one, Weloy, June 1957, Sabrosky; one, hill behind Yaptown, Dec. 1952, Gressitt. RUMUNG: One, June 1957, Sabrosky.

TRUK. WENA (Moen): Two, July 1946, Townes.

PONAPE. Colonia, one, Feb. 1948, Dybas; one, Aug. 1946, Townes; many, 1956-1959, Wheeler, Wasserman, and others; one, Mt. Dolennankap, 510-600 m., Aug. 1946, Townes; one, SE. Nanponmal, Jan. 1953, Gressitt.

KUSAIE. Seven, Lele (Lelu), Feb. 1953, Clarke; one, Mt. Fuinkol, Jan. 1953, Gressitt; three, Mutunlik, Feb. 1953, Clarke; two, Fuinwukat, Mar. 1953, Clarke.

WAKE I. One, Nov. 1953, Joyce.

10. *Drosophila hypocausta* Osten Sacken (fig. 5, e-h).

Drosophila hypocausta Osten Sacken, 1882, Berliner Ent. Zeitschr. 26: 245 (Philippines).—de Meijere, 1911, Tijdschr. Ent. 54: 398.—Pipkin 1956, Ent. Soc. Washington, Proc. 58: 256.

Male: Arista 5-6/4; frons tan, ocellar triangle black; anterior reclinate orbital one-third length of posterior reclinate and one-half length of proclinate. Second oral more than half length of first; palpi sooty, with two strong bristles. Carina broad, flattened on top; cheeks dark brown. Acrostichal hairs in eight rows; basal scutellars convergent. *Mesonotum* yellowish brown with narrow paler stripes on each side along dorsocentrals, and a pale central line. Pleura sooty brown to black, subshining, darkest on sutures. Coxae and femora dark; tibiae dark in middle; tarsi pale. Fore femur with a comblike row of about nine short teeth. Halteres pale.

Tergites with black subshining posterior bands extending to lateral margins. A general increasing darkness occurs with age. *Wings* hyaline, posterior cross vein slightly clouded. C-index 3.6; 4-index 1.1; C3 fringe on basal half. Body length 2.5-3.0 mm.

Female: Arista 5-6/3. Noticeably paler than male; palpi yellowish; pleura yellowish, darker on sutures; abdominal bands brown rather than black, tergite 5 yellow medianly. Eggs with two filaments, each usually split at about one-third from apex into about three curly branches.

DISTRIBUTION: Philippines, Java, Sumatra, Caroline Is.

PALAU. BABELTHUAP: Five, Melekeiok, three, Ngerehelong, May-June 1957, Sabrosky. NGERKABESANG: One, Mar. 1957, Sabrosky.

YAP. TOMIL: three, July-Aug. 1950, Goss. MAP: one, July-Aug. 1950, Goss; one, Oct. 1952, Krauss. YAP: 11, Oct. 1952, Krauss; five, Weloy, two, Kolonia, June 1957, Sabrosky; one, Mt. Matade, Dec. 1952, Gressitt; many, Dugor, July-Aug. 1950, Goss.

TRUK. WENA (Moen): Many, Sept. 1951-Oct. 1952, Pipkin; two, South valley, Mt. Tonaachau, Feb. 1949, Potts; one, Civ. Ad. Area, Mar. 1949, Potts. TOL, DUBLON, UMAN: Many, Sept. 1951-Oct. 1952, Pipkin.

PONAPE. Colonia, many, July 1956, Wheeler; many, July-Aug. 1959, Wheeler and Wasserman.

The original description was based upon males only from the Philippines; the sexual color dimorphism was described by de Meijere, based on specimens from Java. The species was completely redescribed by Pipkin (1956, Ent. Soc. Washington, Proc. 58: 251-258), including internal features, puparia, chromosomes, and other characters.

11. *Drosophila annulipes* Duda (fig. 5, *i-l*).

Drosophila annulipes Duda, 1924, Archiv Naturgesch. A, 90 (3) : 209, 221, 250 (*nomen nudum* in Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 58) (Formosa; type in Deutsch. Ent. Mus., Berlin).

Drosophila virgata Tan, Hsu, and Sheng, 1949, Univ. Texas Pub. 4920: 203.—Okada, 1955, Kontyû 23: 101, pl. 18; 1956, Syst. Study Dros. Japan, 149.

Arista 7/3; frons yellow with a pair of prominent anteriorly converging brown stripes; anterior reclinate orbital half length of proclinate, two-fifths length of posterior reclinate. Cheeks black near vibrissa, otherwise pale; carina pale, slightly sulcate, black at lower edge; palpi dark; second oral bristle more than half length of first.

Mesonotum dull tan with narrow longitudinal darker stripes: a fainter median stripe at midline; a narrow darker one in each dorsocentral row, reaching scutellum; a short one more laterally beginning behind transverse suture; a broken one from above humerus to near wing base. Pleura pale with darker longitudinal stripes: a small one near wing base; a long one from below humerus to base of haltere; a broad one across upper part of sternopleura. Haltere pale, base black. Scutellum tan with two broad dark stripes. Acrostichal hairs in six rows; no prescutellars; basal scutellars divergent. Legs yellow with darker bands: at base and apex of first coxae; near middle of each femur, strongest on inner surface; near base and apex of each tibia. Tarsi pale. Inner surface of first femur in both sexes with a row of short, stout, black spines.

Abdomen yellow with rather narrow black apical bands narrowly interrupted, and separated from black lateral marks. *Wings* dusky, posterior cross vein slightly clouded; C-index 4.0-4.2; 4-index 1.3-1.5; C3 fringe on basal one-fourth. Body length about 3.0-3.5 mm.

DISTRIBUTION: China, Taiwan, Japan, Bonin Is.

BONIN IS. HAHA JIMA: Three females, Okimura, Apr.-May 1958, Snyder. CHICHI JIMA: Female, Miyahama, May-June 1958, Snyder.

The synonymy of *annulipes* and *virgata* is not certain, there being small discrepancies between the descriptions, the redescription of *virgata* by Okada

(1956), and the present four female specimens. We agree with Okada, however, that only a single species is probably involved. Lacking male specimens, we have redrawn Okada's figures of the male genitalia (1955, *Kontyū* 23, pl. 18; 1956, *Syst. Study Dros. Japan*, 149).

12. *Drosophila fumifera* Wheeler and Takada, n. sp.

Female. Frons rusty brown, dull, orbits paler and subshining. Head bristles strong; anterior reclinate orbital half length of proclinate, the latter two-thirds length of posterior reclinate. Antennae light brown. *Arista* 6/3, the small series of branchlets along inner side of main axis more prominent than usual. Face dark tan; carina large and rounded; two strong orals. Cheeks tan, of medium width; palpi tan or light brownish.

Mesonotum tannish brown to light brown, subshining; acrostichal hairs in six fairly regular rows; no prescutellars. Basal scutellars convergent, about equaling apicals in length. Pleura a little darker than mesonotum; two strong sternopleurals, anterior one five-sixths as long as posterior, middle one small and thin. Legs tan, without unusual features.

Abdominal pattern not well preserved on any specimen; apparently tergites are dark tan with brown apical bands interrupted medially. Ovipositor tan, rather narrow and acutely pointed. *Wings* uniformly dark. C-index about 2.8; 4-index about 1.4; C3 fringe on basal three-fourths or a trifle more. Body length 3.0-3.2 mm.

Holotype, female (US 67344), Ngerehelong, Babelthuap, Palau Is., May 8, 1957, Sabrosky; one female paratype (US), Ngiwal, Babelthuap, Palau Is., May 20, 1957, Sabrosky; one female paratype (BISHOP), Weloy, Dugor, Yap, June 15, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau, Yap).

13. *Drosophila* species a.

Arista 4/2; frons tannish brown, dull; ocellar area black; a narrow paler line running anteriorly from ocelli to lunule; orbits well differentiated, shiny; frons with whitish pruinosity when viewed from certain oblique angles. Head bristles strong; anterior reclinate orbital half length of proclinate, a little less than half length of posterior reclinate. Midfrontal hairs arranged in a V-shaped pattern. Face brownish, black below; carina large and broad. Vibrissa surrounded by a cluster of oral hairs. Cheeks brown, posteriorly paler and with three stout bristles. Palpi brown.

Mesonotum chestnut brown, subshining; acrostichal hairs in eight rows; no prescutellars; scutellars broken. Pleura much darker than notum; anterior sternopleural half length of posterior. Legs brownish, rather slender; no teeth on fore femora; basitarsus of middle leg with a short but stout bristle near base beneath.

Wings dusky; C-index about 3.5-3.8; 4-index 1.5; C3 fringe on basal half. *Abdomen* shiny; yellowish with black apical bands which expand at angle of tergites, forming solid black lateral areas. Body length 3.0 mm.

DISTRIBUTION: Caroline Is.

KUSAIE. Mt. Tafeayat, 300-360 m., Aug. 1946, Townes.

The single specimen, sex uncertain, appears to represent an undescribed species, but its description must wait for better preserved material.

Subgenus **Scaptodrosophila** Duda

Scaptodrosophila Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 37 (type: *Scaptodrosophila scaptomyzoidea* Duda; New Guinea).

Pugiodrosophila Duda, 1924, Archiv Naturgesch. A, 90 (3): 203 (type: *Drosophila pugionata* de Meijere; Simalur).

Xiphidiochaeta Duda, 1925, Mus. Nat. Hungarici, Ann. 22: 200 (improper replacement name for *Pugiodrosophila*; type: *D. pugionata* de Meijere).

Pholadoris Sturtevant, 1942, Univ. Texas Pub. 4213: 28 (type: *Drosophila victoria* Sturtevant; United States).

? *Paradrosophila* Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 43 (type: *Drosophila pictipennis* Kertész; New Guinea).

Three strong, subequal sternopleural bristles; prescutellars present; propleural present; posterior gonapophyses of male copulatory apparatus fused or contiguous with penis (in all species so far examined); eggs with six or more filaments.

Most of the known species occur in tropical Asia and Africa, with a fair representation on the islands of the North and South Pacific area. Only a few species are known from the Palaearctic, Nearctic, and Neotropical regions.

Duda described *Scaptodrosophila* as a genus, the high costal index and weak anal vein separating it from his *Paradrosophila*. He later (1926, Suppl. Ent. 14: 70) agreed that such generic status was hardly tenable. The type species, *scaptomyzoidea*, is clearly a *Drosophila* belonging to the subgenus called *Pholadoris* by most authors and *Paradrosophila* by Okada, differing from the other species only in the high C-index. *Drosophila (Pugiodrosophila) pugionata* de Meijere has already been placed in *Pholadoris* by Burla (1954). The subgenus *Paradrosophila* Duda was based on seven assorted species (and three *nomina nuda*) with prescutellar bristles. Wheeler (1957, Univ. Texas Pub. 5721: 80) pointed out that until the type species, *Drosophila pictipennis* Kertész, has been examined more carefully, there is no reason to believe that *Paradrosophila* is the exact equivalent of *Pholadoris*, even though some of the species placed in *Paradrosophila* are certainly co-subgeneric with *Drosophila victoria*, the type of *Pholadoris*, and with *Drosophila scaptomyzoidea*, the type of Duda's *Scaptodrosophila*.

14. *Drosophila bryani* Malloch (fig. 6, *a-d*).

Drosophila bryani Malloch, 1934, Insects of Samoa, 6 (8): 310 [Samoa; type in British Museum (N.H.)].

Drosophila levis Mather, 1955, Australian Jour. Zool. 3: 561 (Queensland; type in Australian Museum, Sydney).

Arista 4/2; frons tan, dull; face and cheeks yellow; carina flat. Anterior recline orbital one-third length of other two; second oral less than half length of first. *Mesonotum* tan to light brown; acrostichal hairs in six rows; prescutellars rather well developed. Basal scutellars convergent, about half length of apicals. Pleura yellowish below, more or less brownish on mesopleura but variable.

Abdomen mostly black, segments 2 to 4 with narrow yellow areas basally and laterally. *Wings* clear; C-index 1.5-1.6; 4-index 2.3; C3 fringe on basal 0.7. *Eggs* with six filaments (four to seven range); egg figured (as *Drosophila* sp. a) by Bohart and Gressitt (1951, B. P. Bishop Mus., Bull. 204, pl. 1) and by Harrison (1954, Ent. Soc. London, Trans. 105: 102). Body length 2.0 mm., not infrequently smaller.

DISTRIBUTION: Samoa, Australia, Philippines, Micronesia (from Guam south).

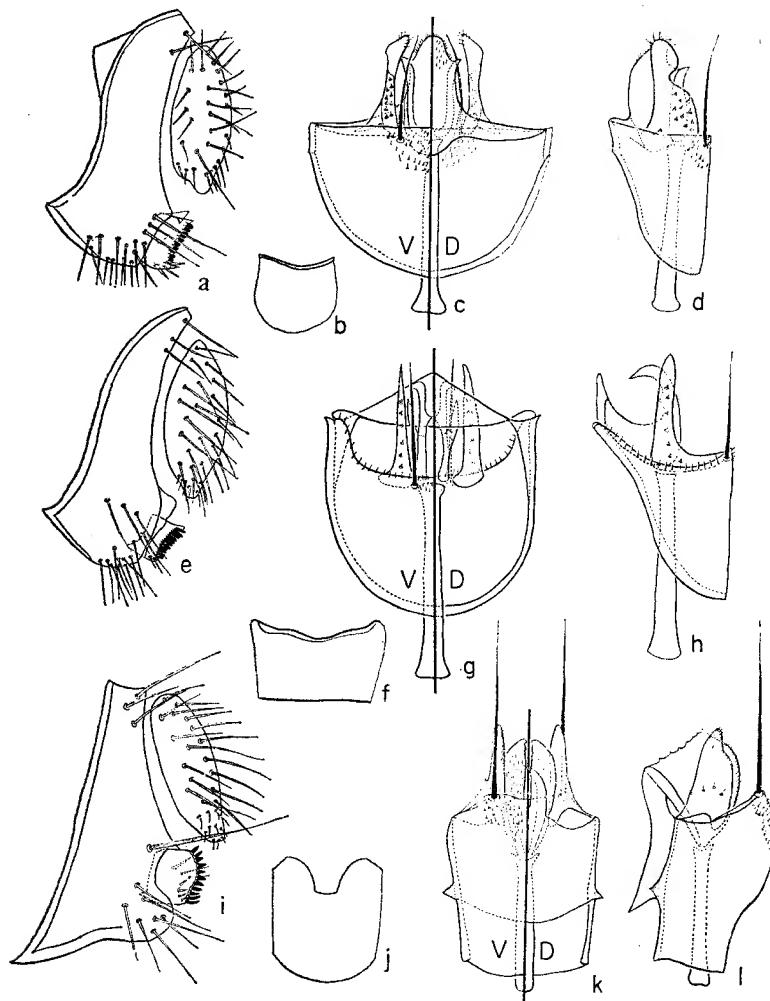


FIGURE 6.—Male genitalia: a-d, *Drosophila bryani*; e-h, *D. anuda*; i-l, *D. palauana*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

S. MARIANA IS. SAIPAN: 16, Med. Bn. 2nd Mar. Div., Sept. 1944. GUAM: Many specimens from many localities; Asan, Aug. 1936, Swezey; Mt. Alifan, Apr. 1946, Aug. 1952, Krauss; Port Ajayan, June 1945, Dybas; Pilgo River, May 1945, Bohart and Gressitt; Ordot, May 1945, Bohart and Gressitt; Pago, May 1945, Gressitt and Bohart; Pt. Ritidian, June 1945, Gressitt; Yona, Merizo, Yigo, Oct. 1957, Krauss; Agana, June 1945, Dybas; Pt. Oca, May 1945, Gressitt and Bohart; Mt. Lamlam, Oct. 1957, Krauss.

PALAU. NGESEBUS: Three, May 1957, Sabrosky. NGERKABESANG: Two, Apr. 1957, Sabrosky. MALAKAL: One, May 1957, Sabrosky. NGAIANGL: Many, May 1957, Sabrosky. NGARMALK (NW Auluptagel): One, Dec. 1952, Gressitt. KOROR: Many, Sept. 1952, Krauss; Dec. 1952, Gressitt; Apr. 1957, Sabrosky; Mar. 1954, Apr.-May 1953, Dec. 1952, Beardsley. BABELTHUAP: One, E. Ngatpang, Dec. 1952, Gressitt; many: Ngiwal, Dec. 1952, Gressitt; Melekeiok, Ngardmau, Airai (Ngarsung), Ngaremenglui, Ngerehelong, May-June 1957, Sabrosky. PELELIU: One, July 1945, Dybas.

YAP. MAP: Five, July-Aug. 1950, Goss; one, Oct. 1952, Krauss. GAGIL: Five, July-Aug. 1950, Goss; seven, June 1957, Sabrosky. TOMIL: Three, July-Aug. 1950, Goss. RUMUNG: Many, June 1957, Sabrosky; one, July-Aug. 1950, Goss. YAP: Many, Sept.-Oct. 1952, Krauss; Weloy, Giliman, June-July 1957, Sabrosky; Kolonia, July-Aug. 1950, Goss; June 1957, Sabrosky; Dugor, July-Aug. 1950, Goss.

CAROLINE ATOLLS. NGULU: Four, Oct. 1952, Krauss. NOMWIN: One, Feb. 1954, Beardsley. IFALUK: Two, Feb. 1953, Beardsley. SATAWAN: Two, Nov. 1952, Beardsley. FARAULEP: Two, Feb. 1953, Beardsley. SATAWAL: One, Feb. 1953, Beardsley. LOSAP: One, Oct. 1952, Beardsley. LAMOTREK: One, Feb. 1953, Beardsley. FAIS: Four, Oct. 1952, Krauss. ULITHI: Three, Oct. 1952, Krauss; three, July 1946, Townes. WOLEAI: Two, Sept. 1952, Krauss; five, July 1946, Townes; one, Feb. 1953, Beardsley. PULO ANNA: One, Sept. 1952, Krauss. SOROL: One, Oct. 1952, Krauss. SONSOROL: One, Sept. 1952, Krauss. TOBI: Three, Sept. 1952, Krauss. KAPINGAMARANGI: Two, Aug. 1946, Townes; many, July 1957, July 1959, Wheeler.

TRUK. TOR: Sept. 1951-Oct. 1952, Pipkin; two, Mt. Unibot, Jan. 1953, Gressitt. PIS: One, June 1946, Townes. WENA (Moen): One, July 1946, Townes; many; Sept. 1951-Oct. 1952, Pipkin; Mt. Tonaachau, Feb.-Mar. 1949, Potts. TONOAS (Dublon): Sept. 1951-Oct. 1952, Pipkin; one, May 1946, Townes. UMAN: Sept. 1951-Oct. 1952, Pipkin.

PONAPE. Colonia, many; June-Sept. 1950, Adams; Feb. 1948, Dybas; Jan. 1938, Esaki; Aug. 1957, Aug. 1956, Wheeler; Aug. 1959, Wheeler and Wasserman; Metalanim Plantation, June-Sept. 1950, Adams; Oa, Aug. 1956, Wheeler; Mt. Temwetemwensekir, Jan. 1953, Gressitt.

KUSAIE. Mutunlik, four, Jan. 1953, Gressitt.

MARSHALL IS. AILINGLAPALAP: Six, Oct. 1953, Beardsley. ARNO: 26, June-July 1950, La Rivers; four, Oct. 1953, Beardsley. NAMORIK: 12, Sept. 1953, Beardsley. LAE: 14, Oct. 1953, Beardsley. EBON: Two, Sept. 1953, Beardsley. MAJURO: Seven, Aug. 1946, Townes; many, July 1955-1959, Wheeler. UJELANG: July 1959, Wheeler. JALUIT: 10, Aug. 1946, Townes. LIKIEP: Two, Aug. 1946, Townes.

GILBERT IS. TARAWA: 14, Nov. 1957, one, Eret, Dec. 1957, Krauss. BUTARITARI: Three, Dec. 1957, Krauss.

Drosophila anuda Curran (1936, Calif. Acad. Sci., Proc. IV, 22: 43) from the Solomon Islands, is very similar to *bryani*, and the two may be sympatric in some parts of the Pacific. In general, the abdominal pattern of *anuda* is paler and less distinct, with the more posterior segments on the males being subshining black. For the male genitalia of *anuda* see figure 6, *e-h*. Pipkin (1953, Am. Naturalist 87: 318) reported *anuda* from Truk; we have examined some of her specimens and have found them all to be *bryani*.

15. *Drosophila palauana* Wheeler and Takada, n. sp. (figs. 6, *i-l*; 8, *b*).

Arista 3/2; frons dull tan, rather narrow; midfrontal hairs scattered; anterior reclinate orbital a trifle closer to procline than to posterior reclinate, about one-third length of other two. Carina rather small; face pale; cheeks pale; palpi pale, with rather strong bristles.

Mesonotum tan, subshining; acrostichal hairs in eight rows, rather irregular; prescutellars moderately strong. Basal scutellars apparently divergent, nearly as long as apicals. Pleura tan; three strong sternopleurals. Legs tan. *Abdominal tergites* yellowish with diffuse, pale tan to brownish apical bands, becoming increasingly fainter on posterior tergites, tergite 6 typically all pale. *Wings* hyaline; C-index about 2.0; 4-index about 2.0; C3 fringe on basal three-fifths.

Body length from 2.0-3.0 mm. in the series from Palau; a little larger in some from Kapingamarangi. A partially extruded egg from a Kapingamarangi female has nine slender filaments.

Holotype, male (US 67345), Koror, Palau Is., Apr. 29, 1957, Sabrosky; allotype, female (US), same data as holotype but Apr. 28, 1957; 25 paratypes (BISHOP, US): Koror I. and Babelthuap I., Melekeiok, May 22, 1957, Ngaremlengui, June 3, 1957, Sabrosky. Not considered paratypes are the following: One, Yap I., Yap, July-Aug. 1950, Goss; five, Matiro I., Hare I., Kapingamarangi, Aug. 3, 4, 1946, Townes; three, Werua I., July 30, 1954, Ringutoru I., Aug. 25, 1954, Kapingamarangi, Niering.

DISTRIBUTION: Caroline Is. (Palau, Yap ?, Kapingamarangi ?).

The specimens from Kapingamarangi appear to be similar to those from Palau, but there are a few relatively minor differences in the male genitalia. In typical *palauana* (fig. 6, *i-l*) the heel of the genital arch is pointed, the anterior gonapophysis is triangular and broad below, with about four sensilla near the middle, and the hypandrium has considerable pubescence near the bases of the strong submedian spines; in the Kapingamarangi males, the heel of the genital arch is slightly rounded, the anterior gonapophysis is slender, has

about eight sensilla, and is a little pubescent below, and the hypandrium is almost bare around the bases of the strong submedian spines. Further study may show that the Kapingamarangi population should be recognized as at least subspecifically distinct.

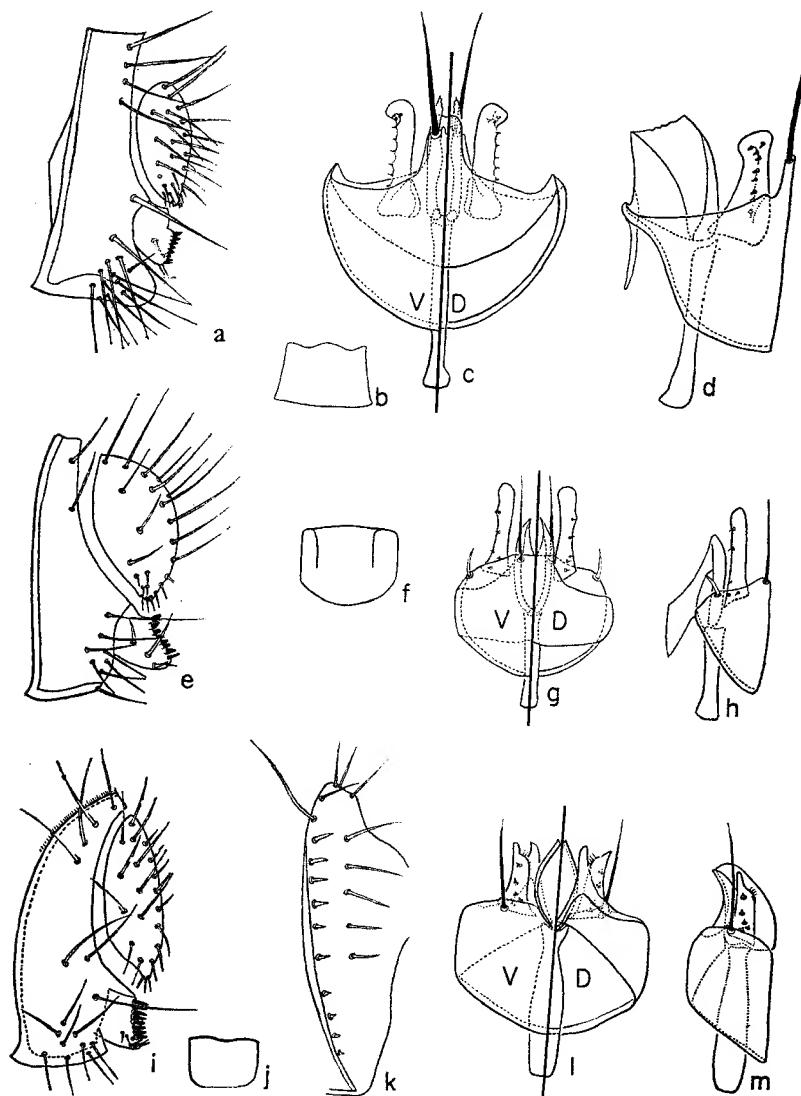


FIGURE 7.—Male genitalia: a-d, *Drosophila moenae*; e-h, *D. fuscopalpis*; i-l, *D. scaptomyzoidea*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

16. *Drosophila moenae* Wheeler and Takada, n. sp. (figs. 7, a-d; 8, d).

Male: *Arista* 5/3-4; frons tan, dull, orbits paler; anterior reclinate orbital short, about one-fourth length of proclinate, latter four-fifths length of posterior reclinate. Antennae tan, segment 3 darker. Face tan, becoming blackish below; carina rather narrow and high; one strong oral, the second only one-third as long. Palpi dark; cheeks pale behind, narrow.

Mesonotum tannish yellow; acrostichal hairs in six rows; prescutellars rather weak. Basal scutellars divergent, about equal to apicals in length. Pleura dark brown, strongly contrasting with paler mesonotum. Posterior sternopleural strong, the other two weaker and shorter. Legs mostly tan but fore coxae dark brown, and femora often somewhat brownish. Abdomen usually all dull black, but on some individuals the tergites are paler basally with blackish apical bands, increasingly darker posteriorly. *Wings*: hyaline; C-index about 2.2; 4-index about 1.9; C3 fringe on basal two-thirds. Body length 1.5-1.8 mm.

Female: Much paler than male; face and legs all pale; pleura at most slightly darker than mesonotum. *Abdominal tergites* yellow with prominent black apical bands with median extensions basally to last tergites, thus appearing as a median longitudinal stripe superimposed on apical bands. Body length 2.0 mm.

Holotype, male (US 67346), allotype, female (US), Mt. Teroken, Moen I., Truk, light trap, Dec. 27, 1952, Gressitt. Twenty-five paratypes (BISHOP, US, CAS), all from Truk; four males, three females, with same data as holotype; three males, four females, Tol I., Mt. Unibot, Dec. 31, 1952-Jan. 4, 1953, Feb. 3, 1953, Gressitt; male, two females, Wena (Moen), 180 m., July 31, 1946, Townes; female, Fefan, May 27, 1946, Townes; two males, five females, Wena (Moen), Civ. Ad. Area, March 1, 7, 1949, Potts.

DISTRIBUTION: Caroline Is. (Truk).

17. *Drosophila eluta* Wheeler and Takada, n. sp. (figs. 8, a; 9, e-h).

Male: *Arista* 4/2; frons tan, paler in midline and on orbits; antennae tan, segment 3 darker; face tan, darker along oral margin; cheeks tan, narrow. Palpi tan. Proclinate orbital three-fourths length of posterior reclinate, and three times length of anterior reclinate. Carina strong, ending abruptly well above oral margin. Vibrissa single. *Mesonotum* brownish with somewhat indistinct darker brown longitudinal stripes: a pair in acrostichal region, reaching scutellum; one just outside each dorsocentral row, evident anteriorly only; one more laterally on each side, evident posteriorly only. Scutellum brownish, paler in midline and on sides. Acrostichal hairs in eight rows; prescutellars relatively weak; basal scutellars divergent, equaling apicals in length. Pleura light brown to blackish; halteres tan. Legs tan. *Abdominal tergites* subshining, yellowish to tan with black apical bands, those of basal tergites somewhat interrupted medianly, tergite 6 nearly all black.

Wing uniformly dusky. C-index 2.1-2.2; 4-index about 1.4; C3 fringe on basal two-thirds. Body length about 2.5 mm.

Female: As above, but generally paler in color. Face all pale; pleura tan, sometimes a little darker posteriorly on mesopleura and sternopleura. Black bands of abdominal tergites reaching laterally to, or only slightly beyond, angle of tergite, leaving pale margins.

Holotype, male (TEX), allotype, female (TEX), four male and seven female paratypes (TEX, US, BISHOP), side of Mt. Tolonashappu, Uh, Ponape, July, Aug. 1959, Wheeler and Wasserman; two female paratypes,

Oa, Ponape, Aug. 1956, Wheeler; one female paratype (CM), Mt. Nanalaud, 600 m., Ponape, March 18, 1948, Dybas.

DISTRIBUTION: Caroline Is. (Ponape).

18. *Drosophila setifera* Wheeler and Takada, n. sp. (figs. 8, c; 9, a-d).

Arista 3/2; frons tan to orange, dull and rather narrow, orbits paler; ocellar area not darker. Anterior reclinate orbital about one-third length of other two and nearly equidistant between them. Antennae tan. Face pale, carina prominent, rounded; vibrissa single; cheeks pale and rather narrow; clypeus and palpi pale.

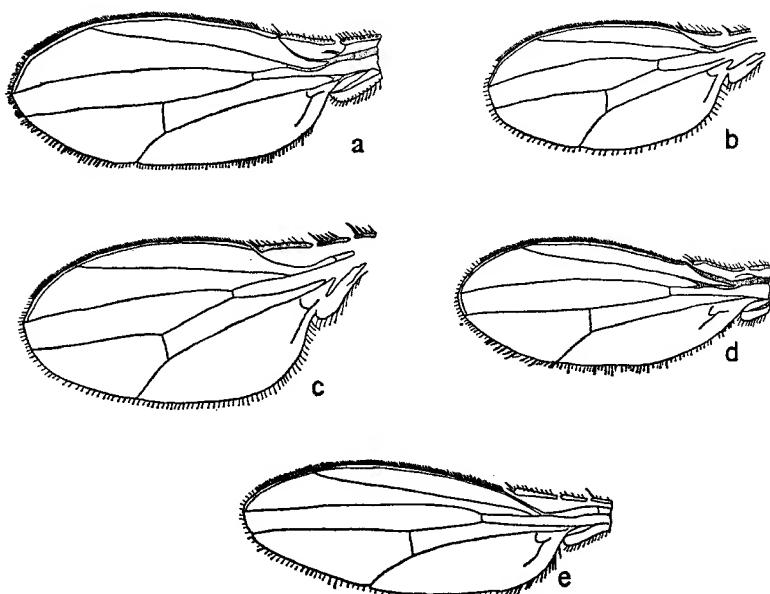


FIGURE 8.—Wings: a, *Drosophila eluta*; b, *D. palauana*; c, *D. setifera*; d, *D. moenae*; e, *D. fuscopalpis*.

Mesonotum tan, pleura a little darker; acrostichal hairs in about eight irregular rows; prescutellars strong. Basal scutellars divergent, equaling apicals in length. Three strong sternopleurals. Legs dark tan. *Abdomen* of male appearing mostly yellowish basally, black apically; tergites 2 to 3 yellow with narrow blackish apical bands; tergite 4 with a broader, darker band; tergites 5 to 6 all black. On female, terminal segments somewhat darker, and more brownish than black. Paramedian spines of hypandrium of male genitalia (fig. 9, c-d) are so large and black that they can usually be seen on the average pinned specimen.

Wings hyaline; C-index about 2.5; 4-index about 1.3; C3 fringe on basal three-fifths. Body length 2.5 to 3.0 mm.

Holotype, male (US 67347), Ngaremenglui, Babelthuap, Palau Is., June 1, 1957, and allotype, female (US), Ngiwal, Babelthuap, Palau Is., May 21,

1957, Sabrosky. Eight paratypes (US, BISHOP): six males, one female, Ngaremlengui, June 1, 1957, Ngerehelong, May 6, 1957, Ngiwal, May 19, 21, 1957, and Melekeiok, May 22, 1957, Babelthuap, Palau Is., Sabrosky; female, E. Ngatpang, 65 m., Babelthuap, Dec. 8, 1952, Gressitt. All but two specimens are labeled at light.

DISTRIBUTION: Caroline Is. (Palau).

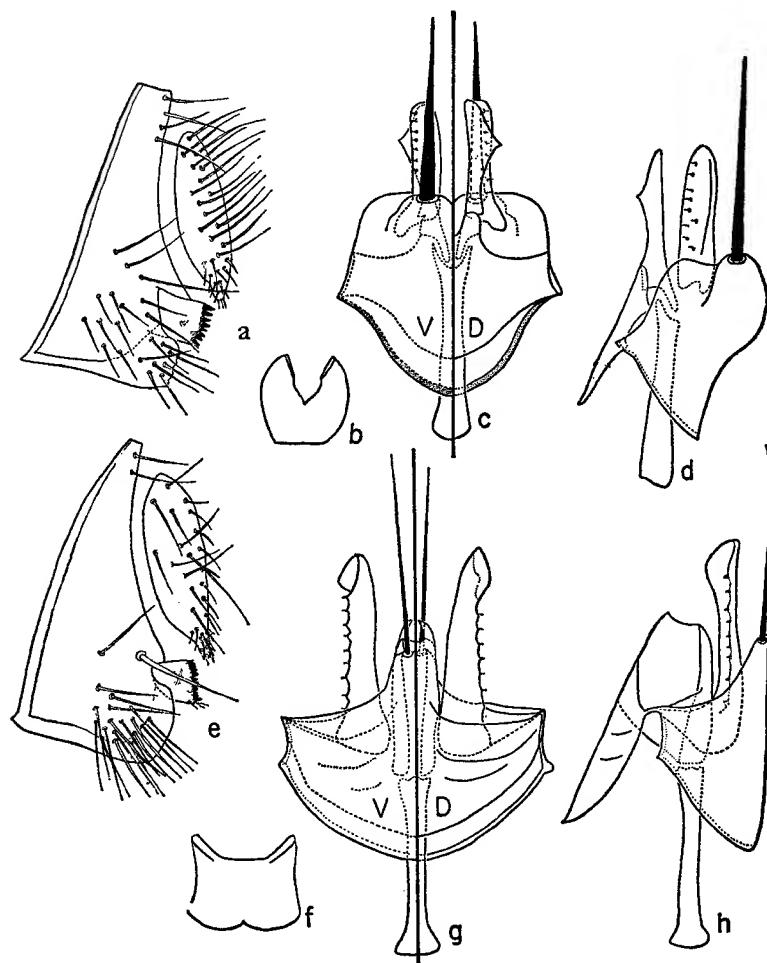


FIGURE 9.—Male genitalia: a-d, *Drosophila setifera*; e-h, *D. eluta*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

19. *Drosophila fuscopalpis* Wheeler and Takada n. sp. (figs. 7, e-h; 8, e).

Arista 4/3; frons dull tannish yellow; anterior reclinate orbital close to proclinate, about one-third length of other two. Carina narrow; vibrissa single; cheeks narrow, pale except around base of vibrissa. Palpi dark brown, contrasting with pale clypeus and proboscis.

Mesonotum yellowish, slightly shiny; there appears to be a slightly darker line in each dorsocentral row, but this may have been produced by preservation. Acrostichal hairs in six rows; prescutellars only moderately strong; basal scutellars divergent, about equaling apicals in length. Pleura and legs pale. Only one truly strong sternopleural bristle, anterior one thin, about half length of large posterior one, middle one thin, about two-thirds length of anterior. *Abdomen* of male light yellowish tan, subshining; tergites 2 to 4 with pale brownish apical bands, diffuse and narrow, failing to reach angles of tergites; tergites 5 to 6 seem wholly pale. Female abdomen seems wholly pale, although there may be slightly darker apical bands on basal tergites.

Wings rather narrow; C-index 2.3; 4-index 2.2; C3 fringe on basal two-thirds. Body length about 1.8 mm.

Holotype, male (US 67438), Ngiwal, Babelthuap, Palau Is., May 19, 1957, at light, Sabrosky; allotype, female (US), same data as male except Ngaremlengui, June 3, 1957, at light. The genitalia of the holotype, mounted in a microvial, is with the remainder of the specimen.

DISTRIBUTION: Caroline Is (Palau).

20. *Drosophila scaptomyzoidea* (Duda), new combination (fig. 7, i-l).

Scaptodrosophila scaptomyzoidea Duda, 1923, Mus. Nat. Hungarici, Ann.

20: 37 (New Guinea; type in Budapest); 1924, Archiv Naturgesch. A, 90 (3): 180, 190, fig. 45 (wing); 1926, Suppl. Ent. 14: 70.

A wholly dull yellow species. *Arista* 4/2; frons dull yellow, anterior reclinate orbital close to proclinate and half its length, about one-third length of posterior reclinate. Face yellow; carina strong; vibrissa single; palpi pale. Entire *thorax* yellow, mesonotum slightly shining. Acrostichal hairs irregularly six-to-eight-rowed; prescutellars about as strong as anterior dorsocentrals; basal scutellars divergent.

Abdomen uniformly yellow, lacking bands on tergites; legs yellow. *Wings* hyaline, rather narrow, anal vein weak. C-index about 4.3; 4-index about 1.8; C3 fringe on basal half. Body length about 1.3 mm. A partially extruded egg, removed from a female specimen from Yap (Giliman, June 1957, Sabrosky), had nine filaments, each slightly less than half the egg length.

DISTRIBUTION: New Guinea, Sumatra, Mariana Is., Caroline Is.

N. MARIANA IS. PAGAN: One, Apr. 1940, Yasumatsu and Yoshimura.

S. MARIANA IS. SAIPAN: One, Garapan-Sadog Tasi, May 1940, Yasumatsu and Yoshimura. GUAM: Many, Pilgo River, May 1945, Bohart and Gressitt; Agana, June 1945, Dybas; Asan, Dec. 1945, Gressitt, Oct. 1947, Dybas; Piti, May 1936, Usinger; Pt. Ritidian, Apr. 1936, Bryan, Aug. 1945, Gressitt, Oct. 1952, Krauss; Tumon Bay, Apr. 1946, Krauss; Pt. Oca, May 1945, Gressitt and Bohart; Mt. Alifan, Oct. 1957, Krauss; Mt. Lamlam, Oct. 1952, Feb. 1958, Krauss, Nov. 1952, Gressitt.

PALAU. NGAIANG (Kayangel): Three, Dec. 1952, Gressitt; three, May 1957, Sabrosky. KOROR: Many, Dec. 1952, Gressitt; Jan.-July 1953, Beards-

ley; Mar. 1957, Sabrosky. NGARMALK (NW. Auluptagel): Seven, Sept. 1952, Krauss; three, Dec. 1952, Gressitt. NGESEBUS: Two, May 1957, Sabrosky. PELELIU: One, May 1957, Sabrosky; one, Aug. 1945, Dybas. BABELTHUAP: Many, Imeliik, Netkeng, June 1957, Sabrosky; E. Ngatpang, Dec. 1952, Gressitt; Ngiwal, May 1957, Sabrosky; Melekeiok, May 1957, Sabrosky; Airai, Ngarsung, May 1957, Sabrosky; Ngaremlengui, June 1957, Sabrosky; Ngerehelong, May 1957, Sabrosky; Gakip, July 1946, Townes. MALAKAL: Many, May 1957, Sabrosky.

YAP. MAP: Three, July-Aug. 1950, Goss; two, Oct. 1952, Krauss. TOMIL: One, July-Aug. 1950, Goss. GAGIL: 10, June 1957, Sabrosky; two, July-Aug. 1950, Goss. RUMUNG: Many, June 1957, Sabrosky; July-Aug. 1950, Goss; Oct. 1952, Krauss. YAP: Many, Aug.-Sept. 1952, Krauss; Kolonia, June 1957, Sabrosky; July-Aug. 1950, Goss; Apr. 1954, Beardsley; Giliman, June 1957, Sabrosky; Mt. Madaade, Dec. 1952, Gressitt; July 1946, Townes; Weloy, June 1957, Sabrosky; Yaptown, July 1946, Townes; Nov. 1952, Gressitt; Kanif, July-Aug. 1950, Goss; Dugor, July-Aug. 1950, Goss.

CAROLINE ATOLLS. FAIS: One, Apr. 1954, Beardsley.

PONAPE. Many, Colonia, Aug. 1959, Wheeler; Nov. 1953, Beardsley; Agric. Expt. Sta., Jan. 1953, Gressitt; Mt. Temwetemwensekir, Jan. 1953, Gressitt; SE. Nanponmal, Jan. 1953, Gressitt; Mt. Dolennankap, Aug. 1946, Townes; Nanpil, Feb. 1948, Dybas.

Subgenus *Hirtodrosophila* Duda

Hirtodrosophila Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 41 (type: *Drosophila latifrontata* Frota-Pessoa; Taiwan).

Dasydrosophila Duda, 1925, Mus. Nat. Hungarici, Ann. 22: 152, 193 (name substituted for *Hirtodrosophila*).

Antennal segment 3 large, bearing unusually long hairs; carina short, confined to upper part of face; arista with, usually, one ventral branch basal to terminal fork; no prescutellar or propleural bristles. Fungivorous species.

21. *Drosophila novicia* Wheeler and Takada, n. sp. (fig. 10, a-d).

Arista 3/1; frons rather broad, yellow, ocellar area not darker; anterior reclinate orbital nearly midway between other two, about one-fourth their length. Antennae tan, segment 3 darker, large and long-haired. Carina undeveloped, middle of face somewhat convex; vibrissa single; cheeks tan, broad. Palpi tan to pale brownish.

Mesonotum tan; acrostichal hairs in eight rows; no prescutellars; anterior dorso-central a little more than half length of posterior; one specimen has an extra dorso-central pair just anterior to usual ones. Basal scutellars convergent, almost equaling apicals in length. Pleura and legs wholly pale; anterior stenopleural slightly more than half length of posterior, middle one small. Halteres pale.

Abdominal pattern poorly preserved; tergites appear to be tan with poorly defined dark brown to blackish apical bands, becoming less extensive on more posterior ter-

gites; tergite 6 of male with only a median dark area. Wings hyaline; C-index about 1.8; 4-index about 1.8; C3 fringe on basal four-fifths.
Body length up to 3.0 mm.

Holotype, male (US 67349), Okimura, Haha Jima, Bonin Is., Apr. 26-May 9, 1958, Snyder; one male paratype (US), same data as type; one male,

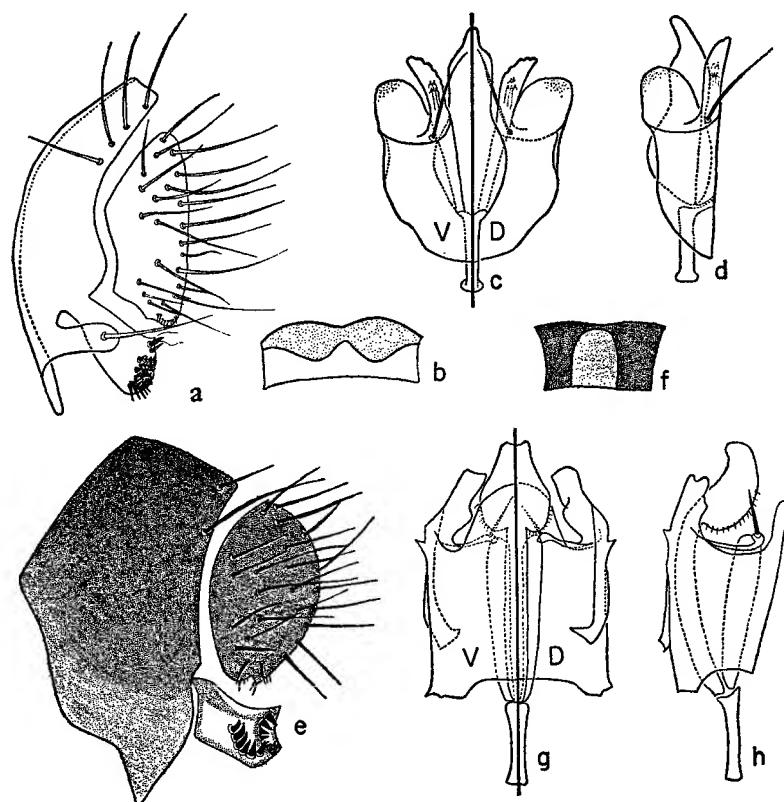


FIGURE 10.—Male genitalia: a-d, *Drosophila novicia*; e-h, *Drosophila* sp. b. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

one female paratype (BISHOP), Ngarmalk (NW. Auluptagel), 25 m., Palau Is., Dec. 12, 1952, Gressitt; one male paratype, Malakal I., Palau Is., May 2, 1957, Sabrosky.

DISTRIBUTION: Bonin Is. (Haha Jima), Caroline Is. (Palau).

The genitalia of the three males were compared microscopically; each preparation is in a microvial and with the specimen.

Drosophila novicia agrees quite well with the description of *longecrinita* Duda (1924, Archiv Naturgesch. A, 90 (3) : 204, 242; 1926, Suppl. Ent. 14: 69) from Taiwan and New Guinea; he states, however, that the males have long recurved hairs along the inner side of the fore tarsi, which is not true of our male specimens.

22. *Drosophila* species b (fig. 10, e-h).

Arista 3/1; frons yellow, rather broad; anterior reclinate orbital about two-thirds length of other two. Carina rather high and thin above, ceasing abruptly near middle of face; face and cheeks pale, vibrissa single. Palpi dark tan to light brown.

Mesonotum tan; acrostichal hairs in eight rows; no prescutellars; anterior dorso-central a little more than half length of posterior ones. Basal scutellars convergent (?), about as long as apicals. Anterior sternopleural nearly half length of posterior. Pleura and legs pale. *Abdominal tergites* of male tan with black apical bands which become increasingly larger and darker on posterior tergites; on segments 2 to 5 they fail to reach lateral margins, on 6 they cover entire tergite; anal plate and genital arch also black. Abdomen mostly subshining, distinctly shining on tergite 6 and genital arch. Abdominal pattern of female not visible owing to abnormal shrinkage.

Wings hyaline: C-index about 1.6; 4-index about 1.5; C3 fringe on basal five-sixths. Body length about 3.0 mm. on the best specimen (male).

Known from three specimens from Yap, only one of them in good condition: male, Kolonia, June 1957, Sabrosky (male genitalia mounted in microvial with specimen); one female, badly shriveled, and not certainly representing the same species, Rumung I., June 1957, Sabrosky; one broken specimen (half of thorax and all of abdomen missing), Kolonia, June 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Yap).

Judging from the description, the male seems very similar, and possibly conspecific, with *manonoensis* Harrison (1954, Roy. Ent. Soc. London, Trans. 105: 101) from Samoa. There are some discrepancies, however, so that a comparison of the male genitalia will probably be required to show whether the two are the same.

Genus *Scaptomyza* Hardy

Scaptomyza Hardy, 1849, Berwickshire Nat. Club, Proc. 361 (type: *Drosophila graminum* Fallén; Europe).

Arista plumose, with one to two ventral branches; acrostichal hairs in two to four rows; no prescutellars; carina often reduced; rather slender species, many with leaf-mining larvae.

Hackman (1959, Acta Zool. Fenn. 97: 3-73) has arranged the species in nine subgenera, many of which had earlier been treated as genera. The only Micronesian species is the type species of the subgenus *Parascaptomyza* Duda.

23. *Scaptomyza* (*Parascaptomyza*) *pallida* (Zetterstedt). (Figure 11, a-d.)
Drosophila pallida Zetterstedt, 1847, Dipt. Scandinaviae 6: 2571 (Europe; type in Stockholm).

Scaptomyza disticha Duda, 1921, Ver. f. schles. Ins. 13: 64.

Scaptomyza graminum auct., nec Fallén.

Arista 4/1; frons golden brown, ocellar triangle and orbits pollinose grayish yellow. Anterior reclinate orbital one-fourth length of proclinate, the latter three-fourths length of posterior reclinate. Second oral less than half length of first. Face whitish yellow, carina noselike; cheeks pale, darker behind; palpi pale, with a single stout apical bristle.

Acrostichal hairs in two sparse rows; no prescutellars; scutellars subequal. *Mesonotum* varying from yellow to dark gray, typically dull pollinose, with a brown median

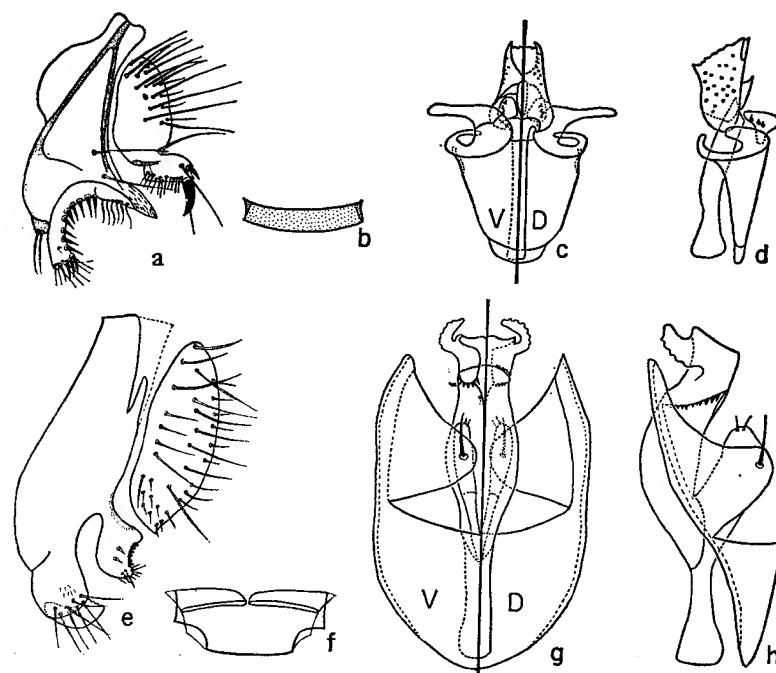


FIGURE 11.—Male genitalia: a-d, *Scaptomyza pallida*; e-h, *Chaetodrosophilella quadrilineata*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

stripe, broad gray stripes along dorsocentral rows, browner laterally; anterior dorsocentrals as far from each other as from posterior ones. Pleura pollinose, light grayish-brown; legs yellow, slender.

Abdomen varying from yellow to blackish, always darker apically; on average males tergites 1 to 4 are dull, brownish laterally, broadly pale in middle, becoming darker posteriorly, tergites 5 to 6 shiny black. Female abdomen generally paler than male, but darker posteriorly.

Wings hyaline: C-index 3.2-3.7; 4-index 1.5; C3 fringe on basal two-fifths. Body length to 2.5 mm. Eggs have two short, thick filaments.

DISTRIBUTION: Worldwide.

BONIN IS. HAHA JIMA: Male, two females, Apr.-May 1958, Snyder.
 CHICHI JIMA: Male, two females; Apr.-May 1958, Snyder.

Genus *Chaetodrosophilella* Duda

Chaetodrosophilella Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 40 (type: *Drosophila quadrilineata* de Meijere; Java).

Chaetodrosophilella Duda, 1924, Archiv Naturgesch. A, 90 (3): 180, 230; 1926, Suppl. Ent. 14: 85; 1927 (1925), Archiv Naturgesch. A, 91 (11): 17.

Drosophila (*Chaetodrosophilella*), Sturtevant, 1927, Philippine Jour. Sci. 32: 367.

Arista plumose, with numerous branches; acrostichal hairs two-to-four-rowed; with extra dorsocentral bristles; no prescutellars; inner surface of fore femora armed with a row of short, stout teeth; dull, orange-yellow species with distinct brown longitudinal stripes.

The type species, *quadrilineata* de Meijere, has been the only included species, but it seems fairly certain that *Drosophila circumdata* Duda (1926, Suppl. Ent. 14: 82, 84), from Sumatra, should be placed in this genus.

24. *Chaetodrosophilella quadrilineata* (de Meijere). (Figure 11, e-h.)

Drosophila quadrilineata de Meijere, 1911, Tijdschr. Ent. 54: 396 (Java; type in Amsterdam).

Chaetodrosophilella quadrilineata, Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 40.

Chaetodrosophilella quadrilineata, Duda, 1924, Archiv Naturgesch. A, 90 (3): 180, 230; 1926, Suppl. Ent. 14: 85.

Drosophila (*Chaetodrosophilella*) *quadrilineata*, Sturtevant, 1927, Philippine Jour. Sci. 32: 367.

Arista 7/3; frons broad, dull, bright orange with three prominent stripes: one on each orbit and one in midline; anterior reclinate orbital minute, proclinate thin, about half length of posterior reclinate, the three spaced well apart. Face bright orange yellow; carina broad, rather flat; two nearly equal thin orals. Cheeks yellow, rather broad, dull above row of oral hairs, shiny below them; palpi pale.

Mesonotum bright orange yellow with four brown longitudinal stripes: one just inside each dorsocentral row, continued posteriorly over scutellum, and one on each side from dorsal side of humerus to near wing base. A less intense stripe just beneath notopleural suture, and on some specimens with a fainter stripe on mesopleura. Pleura mostly dull yellow; posterior sternopleural stout, the other two thin and short. Legs pale; inner surface of fore femur of both sexes with a row of short black teeth apically. Halteres pale. Acrostichal hairs usually two-rowed, sometimes more four-rowed, at least anteriorly; usually with four pairs of dorsocentrals, variable.

Abdomen dull dark yellow, either without bands or with faint, diffuse brownish areas dorsally on tergites 2 to 3. Ovipositor pale, strongly pointed. Egg, as described by Bohart and Gressitt (1951, B. P. Bishop Mus., Bull. 204: 91, pl. 1), has four filaments, anterior pair thin, half length of posterior pair. *Wings* dusky; C-index about 2.2; 4-index about 1.3; C3 fringe on basal three-fifths. Body length about 3.2 mm.

DISTRIBUTION: Java, Philippines, Solomon Is., Admiralty Is., Mari-ana Is.

N. MARIANA IS. AGRIHAN: One, Aug. 1945, Borror and Holder.

S. MARIANA IS. GUAM: Three, Mt. Alifan, two, Tumon Bay, Mar. 1946, Krauss.

Genus **Mycodrosophila** Oldenberg

Mycodrosophila Oldenberg 1914, Archiv Naturgesch. A, 80 (2) : 4 (type: *Amiota poecilogastra* Loew; Europe).

Arista plumose, with one, rarely two, ventral branches; acrostichal hairs numerous; no prescutellars; no anterior dorsocentrals, posterior dorsocentrals sometimes placed rather far from scutellum; distal costal break usually deeply incised, apex of costa blackened and protruding as a broad lappet; basal scutellars much shorter than apicals. Fungivorous species.

KEY TO MICRONESIAN SPECIES OF MYCODROSOPHILA

1. Distal costal break deep, costa forming a black, broad, protruding lappet; 4-index 2.0 or more..... 2
- Distal costal break weak, costa not lappetlike, though somewhat blackened; 4-index less than 2.0..... 31. *esakii*
- 2(1). Mesopleura, sternopleura, and pteropleura all pale..... 3
- Pleura in part dark..... 5
- 3(2). Halteres pale; black abdominal bands extensive (except on basal tergites), abdomen thus appearing mostly black..... 25. *amabilis*
- Halteres dark, at least on knob; tergites with conspicuous yellow areas as well as black bands..... 4
- 4(3). Large species; black color of costal lappet restricted to that area; C-index about 1.4; tergites 2 to 4 with yellow areas basally..... 26. *gratiosa*
- Small species; C-index about 0.9; black area of costal lappet continued across wing as a stripe; tergites 2 to 4 black..... 28. *carola*
- 5(2). Sternopleura dark; femora and most of fore coxae dark; tarsi of male middle leg with long recurved hairs..... 27. *ponapeae*
- Sternopleura pale; mesopleura and/or pteropleura dark; legs mostly pale; tarsi short-haired..... 6
- 6(5). C-index more than 1.0; a black longitudinal stripe across mesopleura and pteropleura..... 29. *gressitti*
- C-index less than 1.0; pteropleura dark, mesopleura pale..... 30. *wassermani*

25. ***Mycodrosophila amabilis* (de Meijere). (Figure 12, a-d.)**

Drosophila amabilis de Meijere, 1911, Tijdschr. Ent. 54: 405 (Indonesia; type in Amsterdam).

Mycodrosophila amabilis, Duda, 1924, Archiv Naturgesch. A, 90 (3) : 193.

Arista 4/1; proclinate orbital a trifle shorter than posterior reclinate, middle orbital minute. Frons tan, dull, much blacker on each side of ocelli, orbits subshining; frons of both sexes strongly whitish pruinose when viewed from certain angles. Face, cheeks, and clypeus tan, palpi darker tan. *Mesonotum* shiny, black to dark brown, lighter far anteriorly and over humeri; halteres pale; scutellum velvety black. Pleura and legs all pale, legs without recurved hairs; anterior sternopleural thin.

Abdominal tergites 1 to 2 usually all pale, remaining tergites black to dark brown, rather shiny, some specimens with paler areas, especially on tergites 3 and 5. Wings a little brownish; distal costal incision deep, lappet large and black, discoloration continued back to second vein. C-index about 1.3; 4-index about 2.1; C3 fringe not

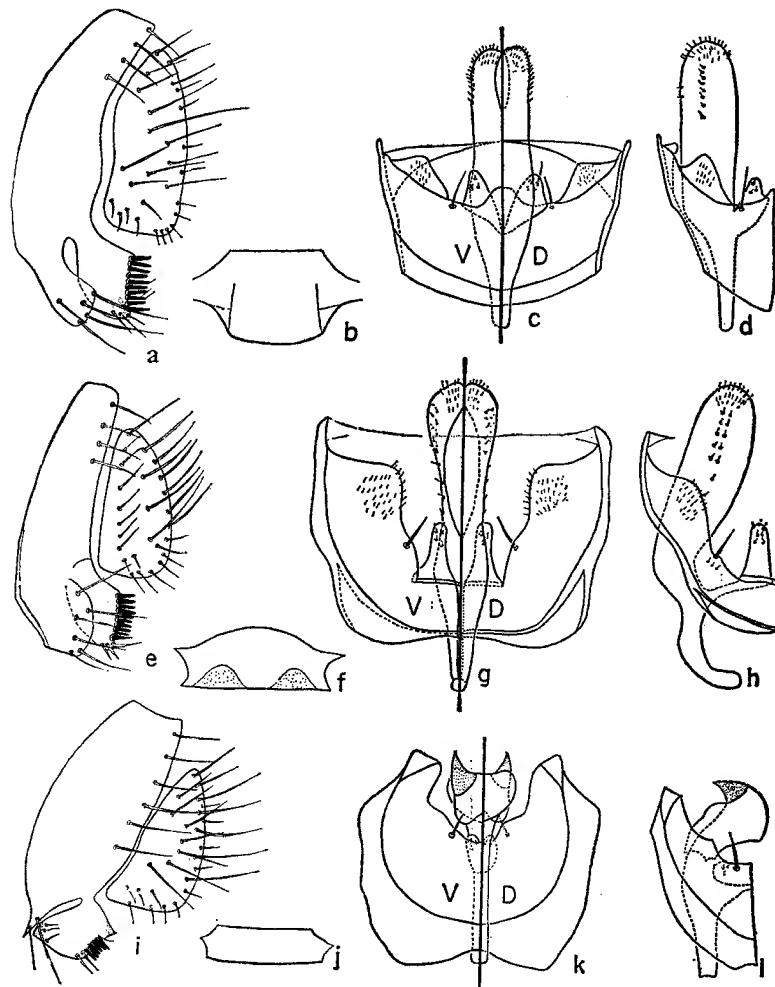


FIGURE 12.—Male genitalia: a-d, *Mycodrosophila amabilis*; e-h, *M. gratiosa*; i-l, *M. carola*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

well-marked, on basal two-thirds to three-fourths; second vein runs straight to costa. Body length about 3.0 mm.

DISTRIBUTION: Indonesia, Caroline Is.

PALAU. PELELIU: 17, east coast, Aug. 1945, Dybas. NGARMALK (NW. Auluptagel): One, Dec. 1952, Gressitt.

26. *Mycodrosophila gratiosa* (de Meijere). (Figure 12, *e-h.*)

Drosophila gratiosa de Meijere, 1911, Tijdschr. Ent. 54: 404 (Java; type in Amsterdam).

Mycodrosophila gratiosa, Sturtevant, 1918, Am. Mus. Nat. Hist., Bull. 38: 442.—Duda, 1924, Archiv Naturgesch. A, 90 (3): 93.—Bezzi, 1928, Diptera Brachycera, Fiji, 156.—Malloch, 1934, Insects of Samoa, 6 (8): 286.

Arista 4/1; proclinate and posterior reclinate orbitalis of equal size, middle orbital minute. Frons dull tan in middle, much blacker behind and on sides, orbits shiny; frons whitish pruinose in both sexes when viewed from certain angles. Face, cheeks, and clypeus light brown; palpi brown. *Mesonotum* shiny, black to dark brown; scutellum velvety black. Pleura wholly pale below level of prothoracic spiracle, some specimens with discoloration below wing base. Legs pale, tarsi without recurved hairs; underside of tarsi of middle legs with a row of short, black, stiff hairs. Knob of haltere usually blackened.

Abdomen yellow with prominent black bands: tergite 1 yellow, 2 to 4 with narrow apical black bands, those of 3 to 4 expanded in middle; 5 with a broad V-shaped band, rest of abdomen pale. *Wings* hyaline; distal costal incision deep, lappet broad, black. Second vein runs straight to costa. C-index 1.3-1.4; 4-index about 2.2; C3 fringe on about basal two-thirds. Body length up to 2.5 mm.

DISTRIBUTION: Indonesia, Fiji, Samoa, Solomon Is., Micronesia from Guam to Kusaie.

S. MARIANA IS. GUAM: One, Mt. Alifan, Mar. 1946, Krauss.

PALAU. NGARMALK (NW. Auluptagel): Eight, 25 m., Dec. 1952, light trap, Gressitt. KOROR: One, May 1957, Sabrosky; one, May 1953, at light, Beardsley. PELELIU: One, east coast, Aug. 1945, Dybas.

YAP. RUMUNG: Three, June 1957, Sabrosky. YAP: Kolonia, one, June 1957, Sabrosky; one, Mt. Madaade, 95 m., Dec. 1952, light trap, Gressitt.

CAROLINE ATOLLS. NAMA: One, Feb. 1949, Potts. TOBI: Three, Sept. 1952, Krauss. SATAWAL: One, Sept. 1952, Krauss. WOLEAI: One, Wagel I., Sept. 1952, Krauss.

KUSAIE. One, Mutunlik, 22 m., Feb. 1953, Clarke; one, Mt. Tafeayat, 240-360 m., Aug. 1946, Townes.

27. *Mycodrosophila ponapeae* Wheeler and Takada, n. sp. (fig. 13, *a-f.*)

Arista 4/1; proclinate orbital nine-tenths length of posterior reclinate, middle orbital minute. Frons dull brown, orbits shiny. Face yellow to whitish, clypeus brown; cheeks brown below eye, pale behind; palpi black. *Mesonotum* shiny, very dark brown; scutellum velvety black. Mesopleura and pteropleura pale, sternopleura dark brown; knob of halteres black. Fore coxae pale basally, brown apically; all femora brown; tibiae and tarsi of middle leg of male with long recurved hairs (fig. 13, *e*).

Abdominal tergite 1 pale, 2 with narrow black apical band, 3 nearly all black, 4 with a narrow transverse stripe across middle, thickened medially, 5 with a broad, V-shaped band reaching extreme lateral margins; tergite 6 with weak median and apical dark areas. *Wings* dusky; distal costal incision deep, lappet broad, black; a distinct brownish area running from lappet to fifth vein, and a weakly brownish area around apex of second vein, the latter straight to costa. C-index about 1.3; 4-index about 2.1; C3 fringe on basal three-fourths. Body length 2.5-3.0 mm.

Holotype male (TEX), allotype, female (TEX), and 27 paratypes (TEX, US, BISHOP), Colonia area, Ponape, July-Aug. 1959, Wheeler and Wasserman. Forty-two additional specimens from Ponape, as follows: 38, Colonia area, Aug. 1956, Wheeler; one, Oa, Aug. 1956, Wheeler; one, Colonia, Nanpil (Nampir), Jan. 1938, Esaki; one, Agric. Expt. Sta., Sept. 1950, Adams.

DISTRIBUTION: Caroline Is. (Ponape).

The species is quite common on shelf fungi on Ponape; no attempt was made by Wheeler and Wasserman to collect all of the several hundred in-

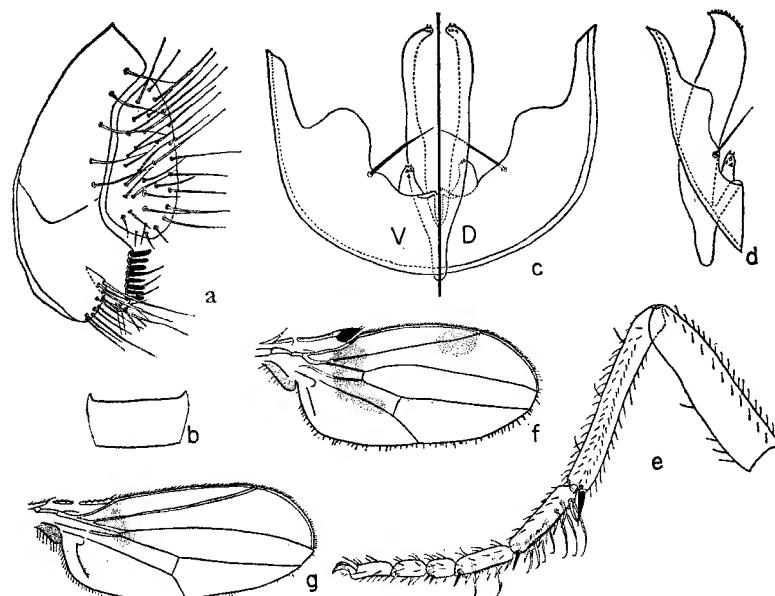


FIGURE 13.—a-f, *Mycodrosophila ponapeae*: a-d, male genitalia; e, mid tibia and tarsus of male; f, wing. g, *M. esakii*, wing.

dividuals seen. Attempts to culture it on the standard *Drosophila* medium were unsuccessful.

28. *Mycodrosophila carola* Wheeler and Takada, n. sp. (figs. 12, i-l; 15, a).

Arista 4/1; proclinate and posterior reclinate orbita subequal, middle orbital minute. Frons tan, darker on sides and rear, dull, orbits narrow and subshining; frons pruinose when seen from certain angles. Antennae pale tan; face tan, darker below; clypeus light brown; cheek brownish below eye, paler behind; palpi tan.

Mesonotum shiny, blackish brown; scutellum velvety, dark brown to black. Pleura all pale except for a brown stripe along notopleural suture; knob of haltere black. Legs all pale; fore tarsi of males with a few recurved hairs. *Abdominal tergites* 2 to 4 appear all black dorsally, bands ceasing abruptly just beyond angles of tergites; 5 with a broad apical band, broadened medially; rest of abdomen pale. *Wings* hyaline;

distal costal incision moderately deep, lappet moderately enlarged, black; a fairly evident brownish stripe from lappet to fifth vein. C-index about 0.9; 4-index about 2.0; C3 fringe on basal three-fifths. Body length up to 2.0 mm.

Holotype, male (US 67350), E. Ngatpang, Babelthuap, Palau Is., 65 m., light trap, Dec. 8, 1952, Gressitt; allotype, female (US), Yaptown, Yap, July 13, 1946, Townes. Paratypes (CM, BISHOP, US, MCZ): One, Peleliu, Palau Is., east coast, Aug. 1, 1945, Dybas, two, Ngarmalk (NW. Aulup-tagel), 25 m., light trap, Dec. 12, 1952, Gressitt; two, Yaptown, Yap, July

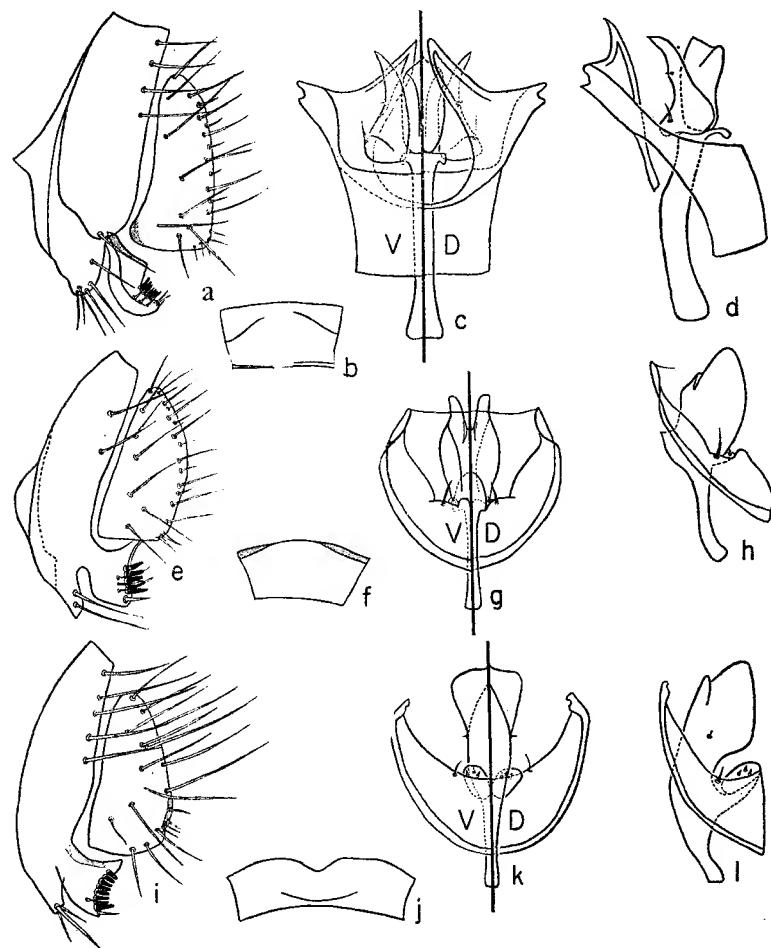


FIGURE 14.—Male genitalia: a-d, *Mycodrosophila gressitti*; e-h, *M. wassermani*; i-l, *M. esakii*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.

13, 1946, Townes; four, Ruul Distr., four, S. Map I., two, Tomil Distr., July-Aug. 1950, Goss.

DISTRIBUTION: Caroline Is. (Palau, Yap).

The species seems very similar to *buxtoni* Malloch from Samoa, but the latter has pale halteres, a different abdominal pattern, and other differences.

29. *Mycodrosophila gressitti* Wheeler and Takada, n. sp. (fig. 14, a-d).

Arista 4/1 or 5/1; proclinate and posterior reclinate orbital subequal, middle orbital minute. Frons black, dull, orbits shiny and extending rather far forward. Antennae and face tan; cheeks tan, shiny, rather broad; palpi brown. *Mesonotum* quite shiny, acrostichal hairs thin, relatively sparse and inconspicuous; scutellum velvety black. Pleura with a conspicuous black longitudinal stripe from near base of first coxa to haltere, between this stripe and brown notopleura area noticeably whitish; remainder of pleura pale. Legs pale, apices of femora often a little brownish; no recurved hairs seen on tarsi of available specimens. Halteres black.

Abdominal pattern not clearly shown on any specimen; there seem to be dark bands on tergites 2 to 5, an apical one on tergite 2, weak basal and apical bands on 3 to 4, connected medianly, 5 with a broad apical band. *Wings* hyaline; distal costal incision moderately deep, lappet black, of medium size. C-index 1.1-1.2; 4-index 3.0-3.3; C3 fringe on basal half. Body length about 1.5 mm.

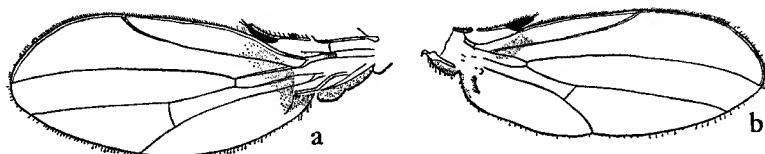


FIGURE 15.—Wings: a, *Mycodrosophila carola*; b, *M. wassermani*.

Holotype, male? (US 67351), allotype, female (US), and one paratype, male (BISHOP), Ngarmalk (NW. Auluptagel), Palau Is., 25 m., light trap, Dec. 12, 1952, Gressitt; one paratype, female, same data as male, but Dec. 13, 1952.

DISTRIBUTION: Caroline Is. (Palau).

30. *Mycodrosophila wassermani* Wheeler and Takada, n. sp. (figs. 14, e-h; 15, b).

Arista 4/1; proclinate orbital a trifle longer than posterior reclinate, middle orbital minute. Frons light tan, dull, orbits narrow, subshining; frons slightly pruinose when viewed from certain angles. Face tan; clypeus and palpi brown; cheek brown below eye, paler behind, rather narrow.

Mesonotum light tan to brownish, with a translucent quality, quite shiny; scutellum velvety brown. Pleura mostly pale whitish yellow, with two prominent brown areas: a stripe running anteriorly from wing base along notopleural suture, across prothoracic spiracle to base of fore coxa; a more prominent stripe over pteropleura to base of haltere; haltere black. Legs pale; tarsi without recurved hairs.

Abdomen with tergite 1 pale, 2 with a dark brown apical band which tends to be broadly expanded on each side of the median line; tergites 3 to 4 mostly dark, becom-

ing pale at lateral edges; 5 with distinct apical band, expanded medianly; 6 with a median triangular brown area. *Wings* hyaline; costal incision very deep, lappet quite large, black; a little brownish discoloration between lappet and second vein. C-index about 0.8; 4-index about 2.9; C3 fringe on basal one-half to three-fifths. Body length up to 1.5 mm.

Holotype, male (TEX), allotype, female (US 67352), five female and one male paratypes (TEX, BISHOP), all taken from mushroom-type fungi near and in Colonia, Ponape, July-Aug. 1959, Wheeler and Wasserman.

DISTRIBUTION: Caroline Is. (Ponape).

31. *Mycodrosophila esakii* Wheeler and Takada, n. sp. (figs. 13, g; 14, i-l).

Arista 4/1, rarely 4/2; proclinate and posterior reclinate orbitalia subequal, middle one minute. Frons tan, dull, a little blacker behind, orbits narrow, shiny. Antennae tan, segment 3 darker; face pale tan, carina rather low; cheek narrow, dark around vibrissa, much whiter behind; clypeus and palpi brown. *Mesonotum* subshining, rather translucent, light tan with a tendency to be paler in midline, and darker brown on each side. *Scutellum* dull, slightly velvety, mostly tan to light brown, blackened on each side, apex pale. *Pleura* entirely whitish yellow below notopleural suture; legs pale, male tarsi lacking recurved hairs. Knob of haltere black basally, pale apically. *Abdomen* with tergite 1 pale, 2 mostly black, paler near base and at extreme edges; 3 to 4 all black except at lateral margins; 5 to 6 of female with apical bands expanded in the middle; 5 of male as on female, but 6 either entirely pale or with a faint median stripe. *Wings* slightly dusky; distal costal break weak, costa not formed into a lappet, but a little darkened; a diffuse brownish discoloration between costal break and fourth vein. C-index about 1.5; 4-index about 1.5; C3 fringe on basal two-fifths. Body length up to 2.0 mm.

Holotype, male (TEX), allotype, female (TEX) and 37 paratypes (TEX), all from mushrooms, Colonia, Ponape, July-Aug. 1959, Wheeler and Wasserman. Seven paratypes (KU, BISHOP), One-Nipit, Ponape, July 19, 1939, T. Esaki. We also have one female from the Solomon Is. (Guadalcanal, Jan. 1945, C. O. Berg) which seems to be referable to this species.

DISTRIBUTION: Caroline Is. (Ponape), Solomon Is. ?

Mycodrosophila esakii, *alienata* Duda (Sumatra), *albicornis* de Meijere (Simalur) and *separata* de Meijere (Java) all lack the characteristic costal incision and protruding lappet of typical *Mycodrosophila*, and probably represent a valid subgenus. Duda (1940, Mus. Nat. Hungarici, Ann. 33: 19-20) erected the subgenus *Dichaetophora** (genus *Drosophila*) for *Drosophila aberrans* Lamb; the characters cited (weak costal break, single pair of dorsocentrals, and other characters) indicate that it might be the group to which these species of *Mycodrosophila* belong. However, since we have not seen the two species included in *Dichaetophora* (*aberrans* Lamb and *agbo* Burla, both from Africa) it does not seem wise to make the generic transfer at this time.

* Two nomenclatural problems are involved in this name. Duda (op. cit.) used the spelling *Dichaetophora* three times and *Dichaetophila* once. From the manner in which the names appear, it seems clear that *Dichaetophora* was intended, and that *Dichaetophila* was an invalid spelling due to an error. *Dichaetophora* Rondani 1868 (Diptera, Sciomyzidae) is not a senior homonym since the two names differ by a letter; however, some later authors (for example, Malloch, 1928, Linn. Soc. New South Wales, Proc. 53: 323) have used the altered form, *Dichaetophora*. As there is no clear evidence that this spelling represents an intentional emendation, we believe that this latter spelling is invalid and does not preoccupy for purposes of homonymy.

Genus **Paramycodrosophila** Duda

Paramycodrosophila Duda, 1924, Archiv Naturgesch. A, **90** (3) : 191 (type: *Drosophila pictula* de Meijere; Java).

Upolomyia Malloch, 1934, Insects of Samoa, **6** (8) : 280 (type: *U. pictifrons* Malloch; Samoa); new synonym.

Distal costal incision deep, the costa forming a broad, black, protruding lappet; C-index less than 2.0; carina extremely narrow, antennal bases close together; arista usually with a single ventral branch basal to terminal fork; antennal segment 3 large; no prescutellars; anterior reclinate orbital large, close to proclinate, either beside it or slightly anterior to it; vibrissa single; usually with a distinct bristly hair on outer side of hind tibia about one-third from base; mesonotum dull, usually with complex color pattern. Fungivorous species as far as known.

KEY TO MICRONESIAN SPECIES OF **PARAMYCODROSOPHILA**

1. Fore femora with basal and apical bands, mid and hind femora with subapical bands; tibiae with basal bands, apical bands weak or absent..... 2
All femora largely brown; tibiae with basal and apical bands..... 35. **species a**
2. Cheeks rather broad, entirely pale; arista 6-8/1..... 3
Cheeks rather narrow, blackened around vibrissal bases; arista 4/1..... 33. **parapictula**
3. Dark bands of tergites 4 to 5 with median pale stripe; two anterior orbitals close together on a black raised prominence; mesonotum anteriorly with two stripes which fuse with a broad transverse stripe near middle of thorax..... 32. **pictula**
Dark bands of tergites 4 to 5 with weak, mostly basal, pale area; anterior orbitals on a slightly raised prominence; mesonotum rather dark, pattern obscure 34. **neopictula**

32. **Paramycodrosophila pictula** (de Meijere). (Figure 16, *a-d.*)

Drosophila pictula de Meijere, 1911, Tijdschr. Ent. **54** : 412 (Java; type in Amsterdam).

Paramycodrosophila pictula, Duda, 1924, Archiv Naturgesch. A, **90** (3) : 191, 241; 1926, Suppl. Ent. **14** : 58.

Arista 6-8/1; all three orbitals subequal, anterior reclinate a bit in front of proclinate, the two situated on a black raised prominence. Postverticals about half length of ocellars. Frons broader than long, brownish, paler in front and on orbits. Antennal segment 2 tan, 3 brown; face pale, only narrow carina darkened; cheeks broad, pale; palpi black. Acrostichal hairs irregularly six-rowed; basal scutellars convergent, about equaling apicals in length. *Mesonotum* dull tan with complex pattern of dark marks, including two anterior stripes within dorsocentral rows which fuse with a broad transverse band at about middle of thorax, and a brown region just anterior to scutellum, narrowly bisected by a pale line; apex of scutellum pale when viewed from certain angles. Pleura dull tan with extensive black marks, especially on sternopleura and upper half of mesopleura. Halteres pale. Prosternum dark. Legs pale with black marks: apically on fore coxae, basally and apically on fore femora, subapically on other femora, basally on tibiae.

Abdomen tan with conspicuous black bands; viewed dorsally, tergites 2 to 3 are all dark, 4 to 5 have paramedian crescentic yellow areas and a narrow median longitudinal stripe; 6 all pale. Wings slightly dusky; distal costal incision deep, the lappet broad and black. C-index about 0.9; 4-index about 1.8; C3 fringe on basal one-half to three-fifths. Body length up to 2.0 mm.

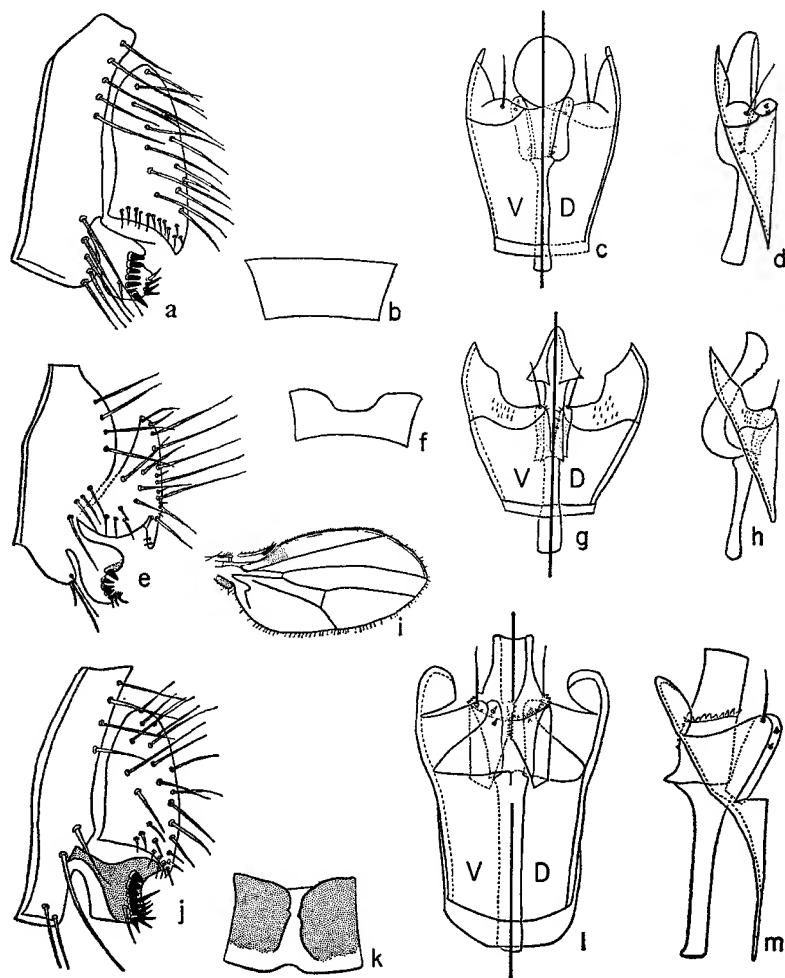


FIGURE 16.—Male genitalia: a-d, *Paramycodrosophila pictula*; e-h, *P. parapictula*; j-m, *P. neopictula*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

DISTRIBUTION: Indonesia, Taiwan, Caroline Is.

PALAU. BABELTHUAP: One, E. Ngatpang, 65 m., light trap, Dec. 1952, Gressitt. NGARMALK (NW. Auluptagel): Three, 25 m., Dec. 1952, light trap, Gressitt.

33. **Paramycodrosophila parapictula** Wheeler and Takada, n. sp. (fig. 16, *e-i*).

Arista 4/1; orbital bristles subequal, two anterior ones on a slightly raised prominence. Frons tan, much paler anteriorly; antennal segment 2 pale, 3 much darker; face pale; cheeks narrow, pale except for black area near vibrissae. Palpi brown. Acrostichal hairs in six irregular rows. *Mesonotum* with indistinct pattern of lighter and darker tan areas; usually with a pair of darker stripes, more or less fused into one, and the darkest near middle of thorax and more posteriorly; scutellum brownish with pale apex. Pleura yellowish with conspicuous dark-brown marks; one above and one below humerus; a mesopleural stripe that becomes narrow anteriorly near base of coxa; sternopleura brown. Halteres pale.

Abdominal pattern complex; viewed dorsally, tergite 2 is dark with diffuse paler median area, 3 is all brown, 4 to 5 with paramedian basal pale areas, 6 all yellow or, in some females, with a small brownish median area. Legs with color pattern as in *pictula*. *Wings* dusky; distal costal incision deep, lappet prominent. C-index about 1.5; 4-index 1.6-2.0; C3 fringe on basal one-third. Body length up to 2.0 mm.

Holotype, male (TEX), and allotype, female (TEX), Colonia, Ponape, July-Aug. 1959, from mushroom, Wheeler and Wasserman. Twenty-two paratypes (BISHOP, US): Three, SE. Nanponmal, Ponape, light trap, Jan. 12, 1953, Gressitt; one each from Ngerehelong, May 8, 1957, Ngaremenglui, June 3, 1957, and Imeliik, Netkeng, June 5, 1957, Babelthuap, Palau Is., all Sabrosky; three, E. Ngatpang, 65 m., Babelthuap, Dec. 9, 1952 and 13, Ngarmalk (NW. Auluptagel), Palau Is., light trap, Dec. 12, 13, 1952, Gressitt.

DISTRIBUTION: Caroline Is. (Palau, Ponape).

34. **Paramycodrosophila neopictula** Wheeler and Takada, n. sp. (fig. 16, *j-m*).

Arista 6-7/1; orbital bristles subequal, anterior reclinate placed beside proclinate; frons dirty tan, darker around bases of two anterior orbitals. Antennal segment 2 yellow, 3 darker; face pale, carina blackish; cheeks rather broad, all pale. Palpi brown. *Mesonotum* brownish, pattern of darker markings obscure. Acrostichal hairs in six irregular rows. Scutellum brown, apex not or slightly paler. Pleura with rather diffuse, poorly outlined darker marks; mesopleural stripe indistinct, more or less continued posteriorly to below wing base; sternopleura brown. Halteres pale. Legs as in *pictula*, brown bands on mid and hind femora broader.

Abdomen with complex banding; viewed from above, male tergite 1 is yellow; 2 yellow, with dark marks on each side apically, 3 black with a moderately broad median yellow stripe, 4 with black apical band with paramedian crescentic basal pale areas, and with a pale median interruption slightly indicated, 5 black with paramedian pale areas, nearer one another than those of 4, and 6 with a triangular median dark mark. On female allotype, median pale areas of tergites 4 to 5 are more extensive and distinct. *Wings* slightly dusky; costal incision deep, lappet black; C-index about 1.1; 4-index about 2.8; C3 fringe on basal three-fifths. Body length 2.8 mm.

Holotype, male (TEX) and allotype, female (TEX), Kapingamarangi Atoll, July-Aug. 1959, Wheeler and Wasserman.

DISTRIBUTION: Caroline Is. (Kapingamarangi).

35. *Paramycodrosophila* species a (fig. 17, a-d).

This apparently undescribed species is represented by a single male, headless, and otherwise in very poor condition. *Mesonotum* seems to be rather brown with yellowish stripes in dorsocentral rows; scutellum is longer than usual, with a prominently pale apex; upper pleural stripe extends posteriorly to below wing base; legs are darker than in other species: fore coxae are nearly all brown, femora are nearly all brown,

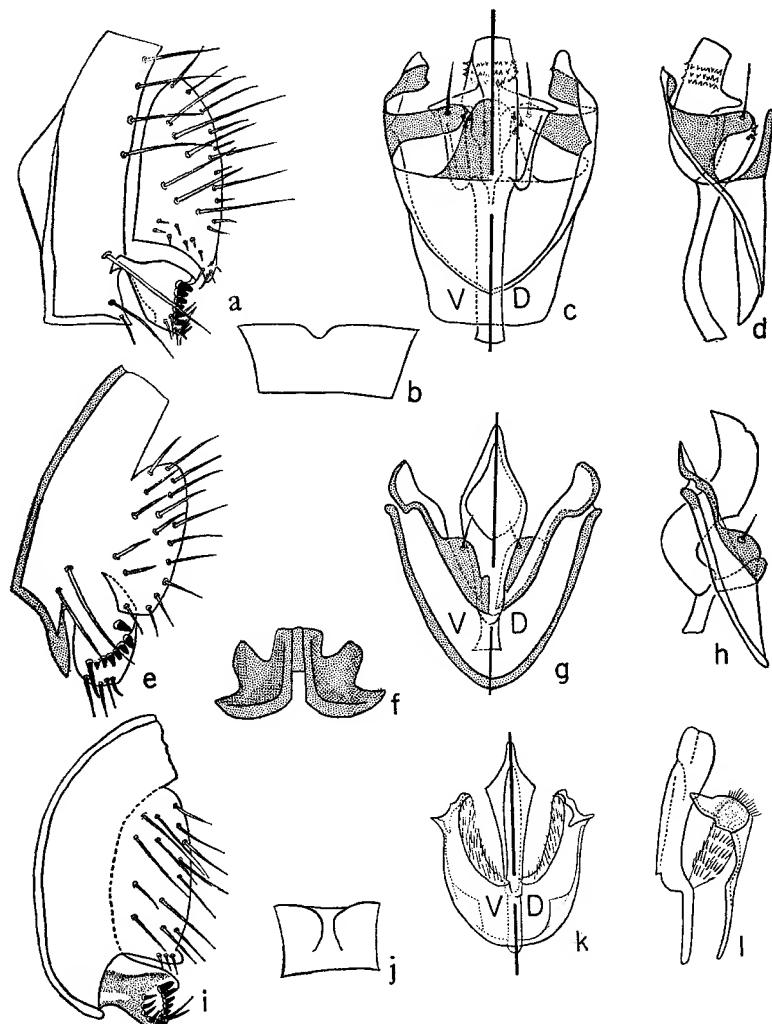


FIGURE 17.—Male genitalia: a-d, *Paramycodrosophila* sp. a; e-h, *Dettopsomyia formosa*; i-l, *D. preciosa*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

and tibiae, at least those of middle and hind legs, have distinct basal and apical dark bands. C-index is about 1.0; and 4-index is probably close to 3.0.

DISTRIBUTION: Caroline Is. (Ponape).

PONAPE. Male, SE. Nanponmal, 70 m., light trap, Jan. 1953, Gressitt.

Genus *Dettopsomyia* Lamb

Dettopsomyia Lamb, 1914, Linn. Soc. London, Trans. 16 (4) : 349 (type: *D. formosa* Lamb; Seychelles).

Pictostyloptera Duda, 1924, Archiv Naturgesch. A, 90 (3) : 192 (type: by present designation, *Drosophila preciosa* de Meijere, the first included species; Java).

Small, with complex thoracic pattern; costal incision deep, protruding lappet thick and black; wings often pictured; second vein often bending suddenly near apex, forming a right angle with costa; two or more pairs of dorsocentrals; acrostichal hairs in two to four rows, often with enlarged acrostichal bristles; antennae plumose, their bases widely separated by greatly enlarged upper part of carina; anterior reclinate orbital beside or in front of proclinate.

This genus is poorly known but appears to have a circumtropical distribution. The center of distribution is probably Indonesia, as about half of the known species are found there, with others in Japan, Taiwan, Australia, Micronesia, Melanesia, and Hawaii. Only two species, however, seem to be very widely distributed: *formosa*, discussed below, and *nigrovittata*, known to be associated with banana plants, from Australia, Japan, Hawaii, California, and the Congo.

KEY TO MICRONESIAN SPECIES OF DETTOPSOMYIA

Marginal cell of wing with two large dark areas, cross veins white, blade otherwise without pattern; a pair of large sutural acrostichal bristles.....	37. <i>preciosa</i>
Wings with extensive pattern of white spots, marginal cell with three dark areas separated by pale ones, blade otherwise with complex pattern; no acrostichal bristles	36. <i>formosa</i>

36. *Dettopsomyia formosa* Lamb (fig. 17, e-h).

Dettopsomyia formosa Lamb, 1914, Linn. Soc. London, Trans. 16 (4) : 350, fig. 33, pl. 20, figs. 36-39 [Seychelles: type in British Museum (N.H.)].

Arista 4-5/2-3; orbital bristles placed far forward, anterior reclinate small and thin. Frons flat; orbits creamy white; ocelli rather far forward, located in a median brown area; between ocelli and orbits are elongate brown and whitish areas. Antennae brown. Face with a pattern of creamy yellow and brown areas: especially prominent is a broad brown transverse band across upper part of carina. Palpi brown. *Mesonotum* dull dark brown with gray pollinose marks forming a very complex pattern; acrostichal hairs sparse, in four irregular rows situated on the median brown stripe. Pleura dull brown, pale along sutures.

Abdomen dull grayish and brownish. Legs banded: tarsi yellow, tibiae with two broad brown bands, femora brown except for yellow apices. *Wings* with complex pattern of spots; especially prominent are two white areas of marginal cell, a large subquadrate brown area over apex of second vein, the latter bending abruptly to costa within this mark, and the comma-shaped white area just beyond apex of second vein. Second posterior cell (just beyond posterior cross vein) typically with five white spots arranged in a circle. C-index about 0.8 (due to abrupt bend in second vein); 4-index 3.5-4.0. Body length up to 1.5 mm.

DISTRIBUTION: Seychelles, Hawaii, Philippines, Solomon Is., Caroline Is., Central America.

PALAU. BABELTHUAP: Five, Ulimang, cut decaying crown betel palm, Dec. 1947, Dybas. NGARMALK (NW. Auluptagel): One, light trap, Dec. 1952, Gressitt.

YAP. YAP: One, hill behind Yaptown, light trap, Nov. 1952, Gressitt.
TRUK. TON (Tol): Two, Mt. Unibot, light trap, Dec. 1952, Gressitt.

37. *Dettopsomyia preciosa* (de Meijere). (Figure 17, *i-l.*)

Drosophila preciosa de Meijere, 1911, Tijdschr. Ent. 54: 410, fig. 49 (Java; type in Amsterdam).

Pictostyloptera preciosa, Duda, 1924, Archiv Naturgesch. A, 90 (3): 192, fig. 39.

Dettopsomyia preciosa, Duda, 1926, Suppl. Ent. 14: 61.

Arista 5/3-4; inner vertical bristles exceptionally long; ocellars much longer than postverticals; proclinate and posterior reclinate orbital close together, rather far forward, anterior reclinate minute. Frons dull, with a pattern of light and dark tan areas; centrally with a large pollinose triangle around ocelli, browner around it. Antennal segment 2 yellow, 3 darker; face mottled with tan and brown; cheeks broad, pale to whitish except along lower border. Palpi brown. *Mesonotum* dull, pollinose tan with a complex pattern of brown marks; especially prominent is a broad median brown stripe that broadens before scutellum and is continued onto scutellar disc; sides and apex of scutellum pale. Anterior dorsocentrals near suture; a pair of enlarged acrostichal bristles slightly before suture; acrostichal hairs sparse, two-rowed. Pleura dull tan with a complex pattern of brown marks and stripes. Legs pale with brown bands, usually all femora and tibiae with both basal and apical bands.

Abdomen subshiny, tan, each tergite with a black apical band, those of more posterior segments larger, especially on sides. *Wings* hyaline, with two quadrate dark marks; distal costal incision and lappet of moderate size. A quadrate brown mark below lappet and a similar mark midway in marginal cell; both cross veins milky white, and areas on each side of brown marks also often whitish. C-index about 1.5; second vein curving to costa rather abruptly; 4-index about 3.0; C3 fringe on basal two-thirds. Body length up to 2.0 mm. One female had a partially extruded egg; although damaged in removal, it showed clearly bases of four filaments.

DISTRIBUTION: Indonesia, Solomon Is., Caroline Is.

PALAU. BABELTHUAP: Eight, Ulimang, Dec. 1947, Dybas; one, Choll, May 1957, Sabrosky. NGARMALK (NW. Auluptagel): Five, light trap, Dec. 1952, Gressitt. ANGAUR: Seven, Feb. 1948, Dybas. Two of the Ulimang specimens are labeled "under bark breadfruit," and the others are labeled "cut decaying crown Betel palm."

Genus **Neotanygastrella** Duda

Neotanygastrella Duda, 1925, Mus. Nat. Hungarici, Ann. 22: 201, 203 (type, *N. tricoloripes* Duda; Costa Rica); 1927 (1925), Archiv Naturgesch. A, 91 (11-12): 17, 65, 70, 142.—Frota-Pessoa and Wheeler, 1951, Rev. Brasil. Biol. 11: 145 ff.—Burla, 1954, Rev. Suisse Zool. 61: 46.

Arista with dorsal and ventral branches; postverticals typically well developed; anterior reclinate orbital beside or in front of proclinate; carina low between antennae, enlarging near oral margin into a bulbous mound, variable in degree; occiput usually whitish pruinose when viewed from certain angles; acrostichal hairs in six to eight rows; no prescutellars; two pairs of dorsocentrals; a minute propleural bristle often present; fore femora and tibiae typically dark, usually fore basitarsi equally dark.

KEY TO MICRONESIAN SPECIES OF **NEOTANYGASTRELLA**

1. Postvertical bristles large; first basitarsus pale.....	2
Postverticals minute or absent; first basitarsus dark.....	40. species b
2. Fore femur and tibia dark, others pale.....	38. <i>pacifica</i>
All femora and tibiae rather dark.....	39. species a

38. **Neotanygastrella pacifica** Wheeler and Takada, n. sp. (fig. 18, *a-d*).

Arista 4/2; anterior reclinate orbital beside proclinate, about two-thirds its length; proclinate about two-thirds length of posterior reclinate. Frons tan, dull, ocellar area blackened; occiput only slightly pruinose; antennal segment 2 brownish, 3 pale basally, brown apically. Face yellow, narrowing below, carina low above, continuing below as a small bilobed mound near oral margin; vibrissa single, followed by a few black bristles. Palpi brown. *Mesonotum* dull tan; acrostichal hairs in about six rows; no prescutellars; basal scutellars divergent, about equaling apicals in length; one strong humeral. Pleura dull, mostly brown with contrastingly paler sutures. Prosternum pale, fore coxae pale except for a brownish mark near base on outer side; fore femora and tibiae dark, other legs all pale, or with femora slightly discolored basally.

Abdomen a little narrow, wholly dull black. *Wings* dusky; C-index about 1.6; 4-index about 1.4; C3 fringe on basal three-fourths. Body length about 2.5 mm.

Holotype, male (TEX), Colonia, Ponape, July-Aug. 1959, Wheeler and Wasserman; allotype, female (BISHOP 3606), Mt. Temwetemwensekir, Ponape, 180 m., Jan. 1, 1953, Gressitt. Eleven paratypes (BISHOP, US, MCZ, KU, CAS): One, same data as holotype; Mt. Temwetemwensekir, Ponape, one, Jan. 1953, Gressitt, and one, June-Sept. 1950, Adams; one, SE. Nanponmal, Ponape, Jan. 12, 1953, Gressitt, one, Colonia, Palikir, Ponape, July 16, 1939, Esaki; one, Mutunlik, Kusaie, Jan. 23, 1953, Gressitt; three, Mt. Tero-ken, Wena (Moen), Truk, Dec. 28, 1952, Feb. 6, 1953 and two, Mt. Unibot, Tol I., Truk, Jan. 2, 3, 1953, Gressitt. Several of the specimens were taken at light traps.

DISTRIBUTION: Caroline Is. (Truk, Ponape, Kusaie).

39. **Neotanygastrella** species a (fig. 18, *e-h*).

A single male, in very poor condition, differs from *pacifica* in several respects, including male genitalia. Cheek is browned below eye; fore coxae are more exten-

sively darkened; all femora and tibiae seem to be brown; pleura appears to be entirely dull brown; anterior reclinate orbital is placed well in front of proclinate; and acrostichal hairs are more nearly eight-rowed.

DISTRIBUTION: Caroline Is.

PONAPE: One, male, south of Nanponmal, *Pandanus*, Jan. 1953, Clarke.

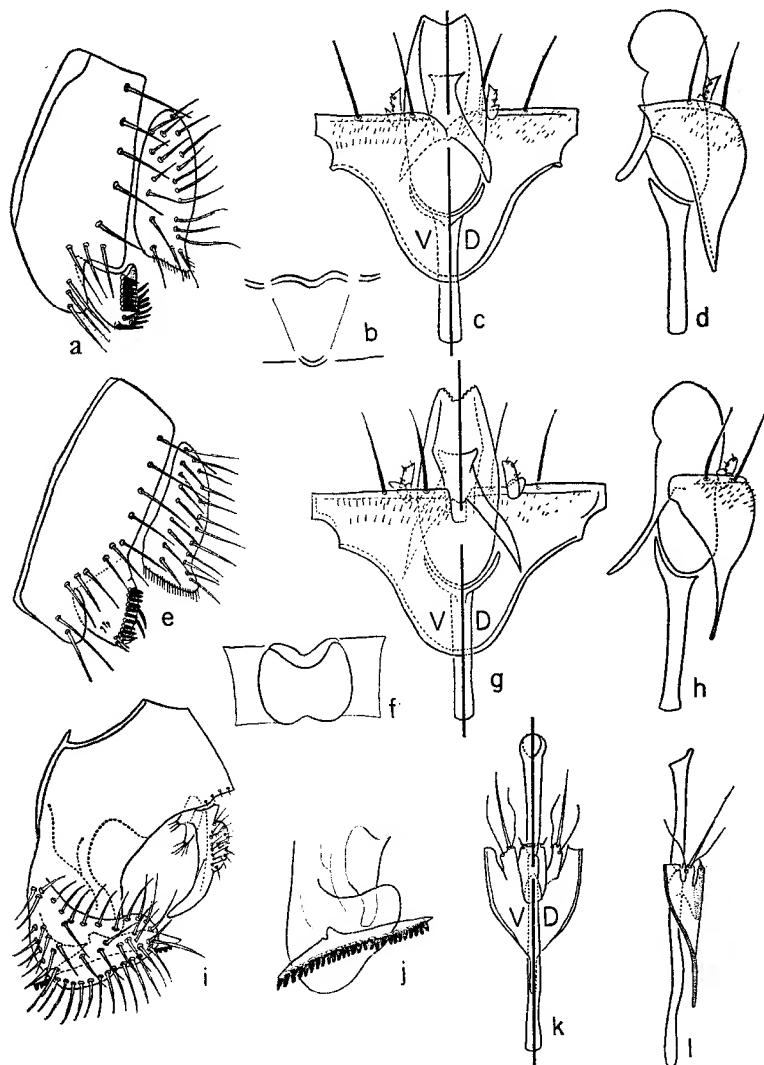


FIGURE 18.—Male genitalia: a-d, *Neotanygastrella pacifica*; e-h, *N. species a*; i-l, *N. species b*. (Shown are genital arch and clasper, bridge connecting claspers [not seen in species b], and copulatory apparatus in ventral (V), dorsal (D), and lateral views; j, detail of clasper, normally hidden beneath genital arch.)

40. *Neotanygastrella* species b (fig. 18, *i-l*).

Arista 4/2; antennal segment 2 brown, 3 pale basally, dark apically. Face pale, greatly narrowed below, carina low. Cheeks linear, pale; palpi pale. *Mesonotum* slender, tan; acrostichal hairs in six rows; no prescutellars. Pleura darkened over mesopleura, especially above first coxae, sternopleura pale. Fore femur black on apical two-thirds; first tibia and basitarsus black, legs otherwise pale.

Abdomen apparently with dark apical bands. *Wings* hyaline; C-index about 1.4; 4-index about 3.0; C3 fringe on basal five-sixths.

DISTRIBUTION: Caroline Is. (Palau).

PALAU. BABELTHUAP: Male, female, E. Ngatpang, 65 m., Dec. 1952, light trap, Gressitt.

This species is clearly aberrant in *Neotanygastrella*, as delimited by the Neotropical members. On the other hand it is closely related to five African species described by Burla (1954, *Rev. Suisse Zool.* 61: 46-54), who commented that they were so different from the typical members of the genus that it was doubtful if they really belonged to *Neotanygastrella*. However, due to the lack of knowledge about the species, he felt that it would be premature to erect a new genus for them. We feel that this complex of species is at least deserving of subgeneric status, but we are unable to decide in which genus they should be placed since they seem quite intermediate between *Chymomyza* and *Neotanygastrella*, *s. str.* Since the specimens of the Micronesian species are in such poor condition, we are not naming the species, and we believe that the matter of the generic-subgeneric arrangement should be postponed for further study.

Genus *Microdrosophila* Malloch

Microdrosophila Malloch, 1921, *Ent. News* 32: 312 (type: *Drosophila quadrata* Sturtevant; North America).—Wheeler, 1952, *Univ. Texas Pub.* 5204: 189.—Burla, 1954, *Rev. Suisse Zool.* 61: 94.—Okada, 1956, *Syst. Study Dros. Japan*, 40.

Incisurifrons Duda, 1924, *Ent. Meddel.* 14: 248 (subgenus of *Drosophila*; type: *D. congesta* Zetterstedt; Europe).—Okada, 1956, *op. cit.*: 40.

Oxystyloptera Duda, 1924, *Archiv Naturgesch. A*, 90 (3): 192 (type: *Drosophila tectifrons* de Meijere; Java).—Burla, 1954, *op. cit.*: 98.

Hopkinsomyia Malloch, 1934, *Insects of Samoa*, 6 (8): 289 (type: *H. convergens* Malloch; Samoa).—Harrison, 1954, *Roy. Ent. Soc. London, Trans.* 105: 110.

Small species; arista plumose; only two strong orbitals, placed rather close together; frons much broader than long; anterior dorsocentrals placed near sutural level; posterior scutellars divergent; C-index not over 1.5; anterior tip of labellum with two outcurved bristles; hind trochanter of male usually with a row of short, stout, black bristles. Eggs, as far as known, with two very long filaments which are more or less fused along their length, thus appearing as a single filament.

In the specimens which we have examined, the last two abdominal spiracles of the male are located in the sixth tergite, rather than in the membrane as in other Drosophilidae, and the male genital arch is usually fused with the anal plates. Both the anal plate-genital arch complex and the sixth tergite have ventral lobes or processes, either of which might be interpreted as the primary clasper. Thorough comparative studies are obviously required before the homologies of the male genitalia can be understood.

Okada (1956, op. cit.) recognized *Incisurifrons* Duda as a valid subgenus; we feel that *Oxystyloptera* Duda should probably be similarly placed, but the genus, *sensu latu*, is so poorly known that we are postponing any action along these lines.

KEY TO MICRONESIAN SPECIES OF MICRODROSOPHILA

1. Palpi tan; C3 fringe reaching apex of third vein; wing tip acute; distal costal incision rather deep, forming a narrow lappet; postverticals of male and female of moderate size, subequal; male genitalia with two slender bristly processes ventrally, clearly evident without dissection.....43. *distincta*
- Palpi brown; C3 fringe not quite reaching apex of third vein; wing rounded at tip; costal incision normal; male postverticals small, those of female larger (small in *ochracella*); inner side of fore femur of male with a single stout bristle near base.....2
2. Scutellum with one or two small marginal hairs in addition to usual four marginal bristles; pleura with a broad dorsal stripe in both sexes; small, mostly pale species.....44. *ochracella*
- Scutellum with only usual marginal bristles; pleura striped or not.....3
3. Humeri and notopleural area brownish, rarely mesopleura a little discolored; abdominal tergites with blackish apical bands.....41. *errator*
- Pleura of darker females with broad brown dorsal stripe, halteres dark, abdomen all black; paler females not readily distinguishable from *errator*; darker males with some mesopleural discoloration, paler specimens separable from *errator* only on genitalia.....42. *pleurolineata*
- (Not keyed: small yellowish species with narrow pleural stripe which is well separated from notopleural area.....45. *species a*)

41. *Microdrosophila errator* Wheeler and Takada, n. sp. (fig. 19, a, c, d, i).

Arista variable, about 13/4-5 in males, 7-9/3 in females; proclinate orbital two-thirds length of posterior reclinata, the latter about four times as far from inner vertical as from proclinate; middle orbital minute. Frons yellowish to tan, paler on orbits; face yellowish to whitish; narrower on males; cheeks pale, linear; antennal segment 2 tan, 3 darker; palpi brown, paler near base; carina present as a low ridge. Postvertical bristles of male much smaller than of female. *Mesonotum* dull tan, typically with a pair of diffuse brownish stripes between dorsocentral lines on posterior half of thorax; acrostichal hairs in about six irregular rows; one humeral; basal scutellars half length of divergent apicals. Halteres pale. Pleura pale, sometimes with a faint discoloration posteriorly on mesopleura; humeral callus browner, and often notopleural area brownish. Legs pale; inner side of fore femur of female without bristles, but on males with a single stout bristle about one-fifth from base. Hind trochanter of males with a row of six to seven black bristles, the last two stouter.

Abdominal tergites dull with poorly defined blackish apical bands; terminal tergites a little paler. *Wings* hyaline; C-index about 1.3; 4-index about 3.0; C3 fringe on basal six-sevenths. Body length of female about 2.0 mm., males smaller.

Holotype, male (TEX), allotype, female (TEX), and 18 paratypes, Colonia, Ponape, July-Aug. 1959, Wheeler and Wasserman; 27 paratypes (BISHOP, US, CAS): 10, Colonia, two, Oa, Ponape, Aug. 1956, Wheeler; two, Mt. Temwetemwensekir, Jan. 19, 1953, two, SE. Nanponmal, Jan. 12, 1953 and one, Agric. Expt. Sta., Colonia, Ponape, Jan. 6, 1953, Gressitt; four, Mutunlik, Kusaie, Jan. 27, 1953, Gressitt; six, Uliga I., Majuro, Marshall Is.,

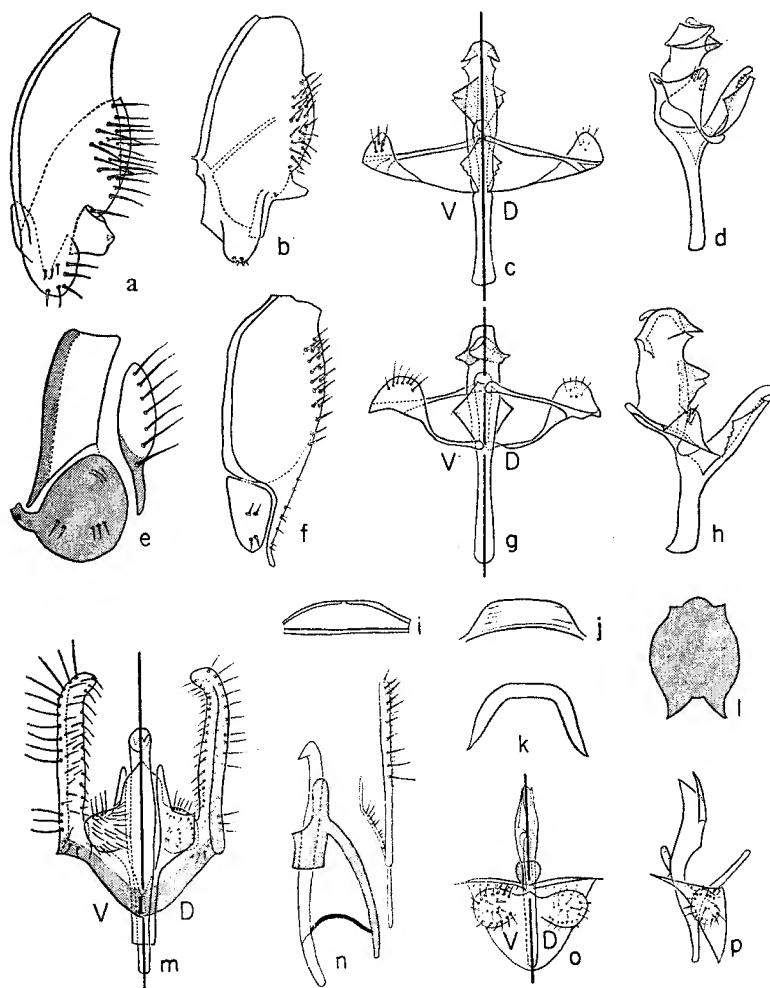


FIGURE 19.—Male genitalia: a, c, d, i, *Microdrosophila errator*; b, g, h, j, *M. pleurolineata*; f, k, o, p, *M. ochracella*; e, l, m, n, *M. distincta*. (Shown are genital arch and its processes (claspers?), bridge between two sides of arch, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

Aug. 1956, Wheeler; four, Ine I., Arno, Marshall Is., June 23, July 30, 1950, La Rivers; one, Namorik, Marshall Is., Sept. 1953, Beardsley.

Distribution: Caroline Is. (Ponape, Kusaie), Marshall Is. (Majuro, Arno, Namorik).

42. *Microdrosophila pleurolineata* Wheeler and Takada, n. sp. (fig. 19, b, g, h, j).

This species is so similar to the preceding that only the salient differences need be pointed out. *Arista* of female about 7/3; of male about 10/4. Females vary from lighter forms which are not readily distinguished from *errator* to rather dark forms which are readily separated. Darker females show a broad brown pleural band over mesopleura and pteropleura, dark halteres, and dull black abdomen; lower part of face may also be darkened. Most paler females show more extensive mesopleural darkening than do those of *errator*; the allotype represents the darker form. Males of the two species are hardly distinguishable except by the genitalia, but *errator* males seldom show any pleural discoloration while males of *pleurolineata* often do.

Holotype, male (US 67353), Koror, Palau Is., May 2, 1957, Sabrosky; allotype, female (US), Ngarmalk (NW. Auluptagel), Palau Is., 25 m., Dec. 13, 1952, Gressitt. In the following list of additional specimens, only those from Palau Is. are considered paratypes.

S. Mariana Is. Saipan: Two, 1-2 mi. E. of Tanapag, Oct. 1945, Dybas; two, As Mahetog, May 1944, Dybas. Guam: Piti, one Sept. 1936, Swezey; Asan, one, Dec. 1945, Gressitt; Pt. Ritidian, seven, Aug. 1945, Gressitt; Pt. Oca (NAMRU2), three, July 1945, Bohart and Gressitt.

Palau. Koror: Eight (US, BISHOP), Apr. 17, 18, 19, 26, 28, 29, 1957, Sabrosky; nine, Dec. 9, 11, 1952, Beardsley. Ngesebus: Two, May 29, 1957, Sabrosky. Ngarmalk I.: One, Apr. 23, 1957, Sabrosky. Babelthuap: One, Melekeiok, May 24, 1957, one, Ngiwal, May 20, 1957, seven, Ngaremlengui, June 1, 3, 1957, Sabrosky; two (CM), Ulimang, Dec. 13, 1947, Dybas. Ngarmalk (NW. Auluptagel): 14, Dec. 12, 13, 1952, Gressitt. E. Ngatpang: Seven, Dec. 8-10, 1952, Gressitt. Ngaiangl: One, May 9, 1957, Sabrosky.

Yap. Map: Two, June 1957, Sabrosky. Rumung: One, June 1957, Sabrosky. Yap: One, Kolonia, 11, Weloy, June 1957, Sabrosky; one, Kanif, July-Aug. 1950, Goss; one, Mt. Madaade, 54, hill behind Yaptown, one, Dugor-Rumu, Nov.-Dec. 1952, Gressitt.

Caroline Atolls. Ifaluk: Two, Ifaluk I., Aug. 1953, Bates.

Truk. Wena (Moen): Two, Mt. Teroken, Moen I., Dec. 1952, Gressitt. Tol: Two, Mt. Unibot, Jan. 1953, Gressitt. Many of the specimens were taken at light traps.

DISTRIBUTION: S. Mariana Is. (Saipan, Guam), Caroline Is. (Palau, Yap, Ifaluk, Truk).

43. *Microdrosophila distincta* Wheeler and Takada, n. sp. (fig. 19, e, l, m, n).

Arista, male 5-6/3; female 6/2. Proclinate orbital four-fifths length of posterior reclinate, distance between them about one-third that between the latter and inner

vertical; anterior reclinate orbital minute. Face pale, carina rather large; cheek pale, only moderately narrow, vibrissa single and with a single stout bristle near rear of cheek. Palpi tan. Usual two dorsocentrals; acrostichal hairs irregularly eight-rowed. *Mesonotum* tan; pleura with a diffuse brown band on upper half, more pronounced on females. Knob of haltere brown. Legs pale, male fore femur apparently lacking a stout bristle on inner side near base.

Abdomen dull black. *Wings* hyaline; distal costal incision rather deep, costa protruding as a thin lappet, terminating in a stout bristle. Wing rather acute at apex; C-index 0.9-1.0; 4-index 4.5-5.0; C3 fringe reaching to apex of third vein. Body length up to 2.0 mm. for females, males smaller.

Holotype, male (US 67354), Ngaremlengui, Babelthuap, Palau Is., June 3, 1957, Sabrosky; allotype, female (US), Ngarmalk (NW. Auluptagel), Palau Is., 25 m., Dec. 12, 1952, Gressitt. Seven paratypes: Male, two females (US), same data as allotype; male, female (BISHOP), E. Ngatpang, Babelthuap, Palau Is., 65 m., Dec. 8, 10, 1952, Gressitt; male, NE. Koror, limestone ridge, 40 m., Dec. 14, 1952, Gressitt; female (CM), Ulimang, Babelthuap, Palau Is., Dec. 10, 1947, Dybas.

DISTRIBUTION: Caroline Is. (Palau).

This species seems closely related to those species placed by Duda in *Oxystyloptera*.

44. *Microdrosophila ochracella* Wheeler and Takada, n. sp. (fig. 19, f, k, o, p).

Arista, male 7/3, female possibly the same. Small, pale tan species with only upper pleura and abdomen darker. Procline orbital only a trifle shorter than posterior reclinate, distance between them about one-fourth that between the latter and inner vertical; anterior reclinate orbital extremely minute. Postverticals small in both sexes. Carina rather narrow; cheek narrow; palpi small, brownish apically. *Mesonotum* tan, a little shining; usual two pairs of dorsocentrals; acrostichal hairs in six irregular rows. Basal scutellars one-third to one-fourth length of apicals, and with one to two small, pale, extra marginal hairs in the region of basals. Pleura with a weak brown band across entire upper half, more pronounced on female. Knob of haltere lightly browned. Legs pale.

Female *abdomen* uniformly dull dark brownish black; male abdomen not so dark, with a tendency to show apical bands on tergites. *Wings* hyaline; C-index about 1.0; 4-index about 4.0; C3 fringe on basal five-sixths. Body length, female, 1.5 mm., males smaller.

Holotype, male (US 67355), Ngarmalk (NW. Auluptagel), Palau Is., 25 m., light trap, Dec. 13, 1952, Gressitt; allotype, female (US) and two male paratypes (TEX, BISHOP), same data as type.

DISTRIBUTION: Caroline Is. (Palau).

45. *Microdrosophila* species a.

Pale yellow species, pleura with a brownish band from near base of first coxa to base of haltere; between band and notopleural suture there is a pale band. *Arista* 5/2 (?) ; palpi brown. Abdomen banded. C-index about 1.3; 4-index about 4.0; C3 fringe on basal five-sixths. Body length 1.5 mm.

DISTRIBUTION: Caroline Is.

PONAPE. Female, Colonia, hydroelectric plant, Aug. 1946, Townes.

Genus *Styloptera* (?) Duda

Styloptera Duda, 1924, Archiv Naturgesch. A, **90** (3) : 192 (type: *S. formosae* Duda, by present designation; Taiwan).

The genus may be characterized tentatively as follows:

Small species; distal costal incision moderately strong, lappet formed by protruding costa of moderate size, blackened, and bearing two apical bristles; three pairs of dorsocentrals; acrostichal hairs in about four rows; no prescutellars; basal scutellars as long as apicals; anterior reclinate orbital moderately well developed, situated rather near proclinate; postverticals of normal size; wing not acute apically; second vein rather straight, approaching costa gradually.

The generic reference for the single specimen described below is uncertain. Duda (op. cit.) placed in *Styloptera* the species *Drosophila pictipes* de Meijere and two new species, *formosae* and *fruhstorferi*, but later (1926, Suppl. Ent. 14: 61) declared that he was retracting the name since a study of *Dettopsomyia formosa* Lamb had shown that the genus *Pictostyloptera* was synonymous with *Dettopsomyia*, and that there were intermediates between *Dettopsomyia* and *Styloptera*. It seems very likely that *pictipes* de Meijere and *fruhstorferi* Duda do belong in *Dettopsomyia*, but that *formosae* (and the new species mentioned below) may well represent a distinct genus. We are preserving the name *Styloptera* for this group by choosing *formosae* (from Taiwan) as the type species rather than one of the *Dettopsomyia*-like forms.

There is a single specimen of an apparently undescribed species near *formosae* in the Micronesian material.

46. ? *Styloptera* species (fig. 20, *a-d*).

Male. Small pale-yellowish species. *Arista* 3/2. *Frons* tan, slightly wider than long, subshining with pollinose orbits. *Ocellars* and *postverticals* subequal, former with their bases outside of triangle formed by ocelli. *Anterior reclinate orbital* beside *proclinate*, both rather far forward; *proclinate* about half length of *posterior reclinate*, distance between them about half that between the latter and *inner vertical*. *Antennae* tan, rather widely separated, segment 2 with three strong bristles. *Carina* forming a moderately low ridge above, disappearing below, lower face concave. *Cheeks* broad, pale; *vibrissa* single; *palpi* pale.

Mesonotum tan, subshining; three pairs of dorsocentrals, those of one side spaced equally apart; *scutellum* tan, basal bristles apparently divergent, equaling apical bristles in length. *Pleura* tan with some brownish color on mesopleura. One *humeral*; *anterior sternopleural* thin, about one-third length of *posterior*. *Abdomen* shrivelled. *Wings* hyaline; distal costal incision moderately deep, lappet small, black, and bearing two apical bristles. *C-index* about 1.7; *4-index* about 2.2; *C3* fringe on basal two-thirds. Body length probably about 1.5 mm.

DISTRIBUTION: Caroline Is.

PALAU. Ulebsehel (Auluptagel, Aurapushekaru): Male, Sept. 1952, Krauss.

Genus *Lissocephala* Malloch

Lissocephala Malloch 1929, Ann. Mag. Nat. Hist. X, 4: 250 (type: *L. unipuncta* Malloch; Africa); 1934, Insects of Samoa, 6 (8): 287.—Burla, 1954, Rev. Suisse Zool. 61: 202.—Harrison, 1954, Roy. Ent. Soc. London, Trans. 105: 111.

Entire frons smooth and glossy; postvertical bristles small; vibrissa single; cheeks linear; one humeral; two pairs of dorsocentrals; acrostichal hairs in six or more rows; mesonotum shiny, often with some metallic color; scutellum dull, basal bristles usually shorter than apicals; abdomen smooth and glossy, with strong bluish, violet, or greenish color. Wings typically with a broad black stripe running diagonally across base from costal break to alula; anal vein absent. Costal index low, often less than 1.0.

KEY TO MICRONESIAN SPECIES OF *LISSOCEPHALA*

Upper pleura with a more or less evident brownish band, sternopleura entirely pale	47. <i>metallescens</i>
Upper pleura with, at most, a trace of a band, sternopleura largely browned, color typically reaching midventral line.....	48. <i>sabroskyi</i>

47. *Lissocephala metallescens* (de Meijere). (Figure 20, *e-h*.)

Drosophila metallescens de Meijere, 1914, Tijdschr. Ent. 57: 265 (Java; type in Amsterdam).—Curran, 1936, Calif. Acad. Sci., Proc. IV, 22: 45.

Liodrosophila metallescens, Duda, 1922, Archiv Naturgesch. A, 88 (4): 160; 1923, Mus. Nat. Hungarici, Ann. 20: 38; 1924, Archiv Naturgesch. A, 90 (3): fig. 46 (wing); 1926, Suppl. Ent. 14: 53.

Lissocephala metallescens, Malloch, 1934, Insects of Samoa, 6 (8): 289.—Harrison, 1954, Roy. Ent. Soc. London, Trans. 105: 112.

Arista 3/2; proclinate orbital three-fifths length of posterior reclinate, anterior reclinate small; frons anteriorly with some evident hairs along lunule. Frons tan, wholly polished. Antennae, face, cheeks, palpi and proboscis all tan; carina rather prominent. *Mesonotum* shiny tan, with metallic-colored reflection posteriorly; acrostichal hairs in about six rows; posterior dorsocentrals quite long, anterior ones about half as long. Scutellum dull tan, almost velvety; basal scutellars short, convergent. Upper pleura with a longitudinal brownish band across mesopleura and pteropleura, usually more strongly developed and with metallic colors on males, weaker on females, but variable; sternopleura all pale. Prosternum typically pale, but brown on specimens from New Georgia. Halteres tan, discolored on occasional specimens. Legs pale, with a tendency for hind tibiae to be diffusely darkened.

Abdomen shining, basal tergites pale, remainder dark brownish with metallic reflections. *Wings* with a prominent dark, diagonal, basal stripe; C-index about 0.9; 4-index about 2.1; posterior cross vein about one-third length of last section of fifth vein; C3 fringe on basal eight-tenths. Body length about 2.0 mm., variable.

DISTRIBUTION: Indonesia, New Guinea, Solomon Is., Santa Cruz Is., western Micronesia.

S. MARIANA IS. GUAM: One, Mt. Lamlam, Oct. 1957, Krauss.

PALAU. NGAIANGL: Five, May 1957, Sabrosky. MALAKAL: Six, May

1957, Sabrosky. NGESEBUS: One, May 1957, Sabrosky. KOROR: One, 25 m., Dec. 1952, Gressitt; eight, Sept. 1952, Jan., Mar., June 1953, Beardsley; 17,

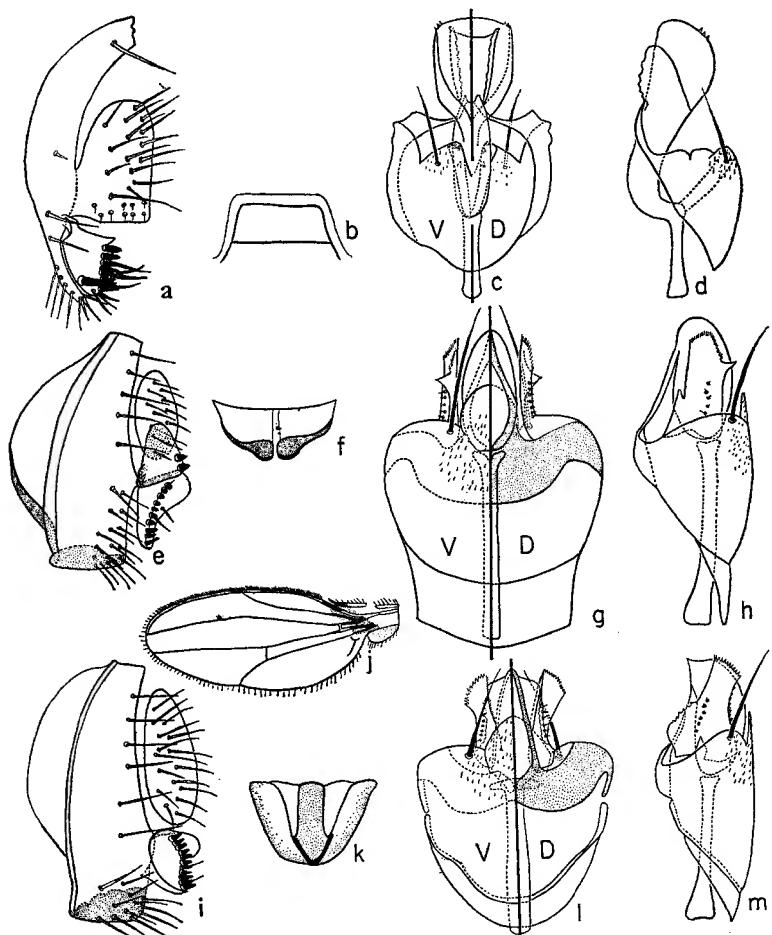


FIGURE 20.—Male genitalia: a-d, *Styloptera* (?) sp.; e-h, *Lisocephala metallescens*; i-m, *L. sabroskyi* (j, wing). (Shown are genital arch and clasper, bridge connecting clasps, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

Mar. 1957, Sabrosky. BABELTHUAP: Six, Melekeiok; seven, Airai, Ngarsung; one, Ngardmau; three, Ngaremenglui; five, Imeliik, Netkeng; four, Ngerehelong; one, Ngiwal; two, Choll, all May-June 1957, Sabrosky; two, Ulimang, Dec. 1947, Dybas; three, Oller, May 1953, Beardsley; one, E. Ngatpang, 65 m., Dec. 1952, Gressitt.

YAP. YAP: Four, July-Aug. 1950, Goss; one, Aug. 1952, Krauss; three, Yaptown, July 1946, Townes; six, Kolonia, July-Aug. 1950, Goss. RUMUNG:

One, June 1957, Sabrosky; one, Tarang, June 1957, Sabrosky. GAGIL-TOMIL: One, Gagil, nine, Tomil, July-Aug. 1950, Goss.

As the original description is brief, and as we have not seen type material, our identification of the Micronesian specimens as *metallescens* is somewhat uncertain. Comparison of the male genitalia will probably be required to settle the point beyond doubt.

48. *Lissocephala sabroskyi* Wheeler and Takada, n. sp. (fig. 20, *i-m*).

Quite similar in most respects to *metallescens*, differing mainly in pleural coloration, wing indices, and male genitalia. Pleura mostly tan, with or without a diffuse darkening along and beneath notopleural suture, but with sternopleura largely brown, pale along upper edge and anterior corner, anterior sternopleural bristle located on pale area, posterior one on brown area. On Palau specimens, sternopleural darkening is continued below to midventral line, while on specimens from the Solomon Islands (New Georgia, C. O. Berg, collector), dark area is diffuse or absent ventrally. Wings hyaline with broad basal, diagonal stripe as in *metallescens*; costa black in both species. C-index about 0.8; 4-index about 1.5, anterior cross vein much nearer wing base than in *metallescens*; C3 fringe on basal eight-tenths. Body length about 2.0 mm., some females even larger.

One female (Melekeiok, Babelthuap, Palau) had an egg protruding from the ovipositor; it was removed and examined; there were 11, possibly 12, rather short thin anterior filaments.

Holotype, male (US 67356) Melekeiok, Babelthuap, Palau Is., May 23, 1957, Sabrosky and allotype, female (US), same locality except May 22, 1957. From about 140 additional specimens from Palau, 40 are being labeled paratypes, representing all localities (BISHOP, US, CAS, CM, MCZ). Babelthuap: 11, Ngibal, May 21, 1957; 14, Melekeiok, May 23, 24, 1957; many, Ngaremlengui, June 2, 3, 1957; three, Airai, Ngerimal, May 26, 1957; 12, Ngerehelong, May 6, 7, 1957; three, Imeliik, Netkeng, all June 6, 1957, Sabrosky; six, E. Ngatpang, 65 m., Dec. 1952, Gressitt. Malakal: Many, May 17, 1957, Sabrosky. Koror: Three, May 2, 1957, Sabrosky; one, June 1953, Beardsley; one, 25 m., SW. Koror, Dec. 1952, Gressitt. There are also 12 specimens from New Georgia, Solomon Is., Apr. 1944, Berg.

DISTRIBUTION: Caroline Is. (Palau), Solomon Is.

Genus *Liodrosophila* Duda

Liodrosophila Duda, 1922, Archiv Naturgesch. A, 88 (4): 153 (type: *Camilla coeruleifrons* de Meijere; Java).—Okada, 1956, Syst. Study Dros. Japan, 57.

Small, shining species, often with metallic colors; frons with a glossy to mirror-like frontal triangle separated by dull lines from the shiny orbits; lunular bristles reduced; postverticals small to minute; vibrissa single; cheek linear; acrostichal hairs in 2-4-6-8 rows; two pairs dorsocentrals; no prescutellars; scutellum dull, velvety, typically black; inner side of fore femur often with a row of short black spinelike teeth; wings hyaline; C-index low.

The genus is very poorly known; none of the four Micronesian species can be identified with any of the 12 previously described species (from Indonesia, Japan, Samoa). Two of our species, represented by single, poorly preserved individuals, are not being named.

KEY TO MICRONESIAN SPECIES OF LIODROSOPHILA

1. Dark brown to black species, with wholly dark pleura; coxae and femora dark 2
- Pleura pale on lower half or with central longitudinal stripe; legs pale 3
2. Male genitalia as in figure 21, *a-d* 49. *nana*
- Male genitalia as in figure 21, *f-i* 50. *trukana*
3. Pleura dark on upper half, pale on lower half; halteres dark brown 51. species a
- Pleura tan with an irregular brown stripe across upper part of sternopleura; halteres pale 52. species b

49. Liodrosophila nana Wheeler and Takada, n. sp. (fig. 21, *a-e*).

Arista 3-4/2; proclinate orbital two-thirds length of posterior reclinate; anterior reclinate one-third length of proclinate; ocellars, inner and outer verticals rather strong; postverticals rather short. Frons glossy black, depressed lines between orbits and midfrons not strikingly dull. Antennal segment 2 tan, 3 darker; face light to dark brown, carina prominent, rounded; palpi brownish. *Mesonotum* glossy, dark brown to black, not especially metallic; acrostichal hairs in six to eight rows, mostly eight; scutellum velvety black, basal bristles two-thirds length of apicals. Two humerals; three subequal sternopleurals. Pleura entirely dark brown, subshining; halteres pale. Coxae and femora brown, tibiae paler, tarsi still paler; inner side of fore femora without a row of stout spines.

Abdomen entirely glossy black, with a little or no metallic color. *Wings* hyaline; C-index about 0.9; 4-index about 2.8; posterior cross vein half length of last section of fifth vein; C3 fringe on basal three-fourths. Body length about 1.3 mm. Egg has eight short, stubby filaments.

Holotype, male (TEX), allotype, female (TEX), and 33 paratypes, Colonia, Ponape, July-Aug. 1959, Wheeler and Wasserman. Additional paratypes, all from Ponape: one, Colonia, one, Oa, Aug. 1956, Wheeler; seven (BISHOP, US), Mt. Temwetemwensekir, 180 m., Jan. 17, 18, 19, 1953, two, Agric. Expt. Sta., Colonia, Jan. 6, 20, 1953, one, SE. Nanponmal, Jan. 11, 1953, Gressitt. One specimen in poor condition and not positively identified as *nana*, Mokil Atoll, Jan. 27, 1953, Gressitt; also three, Guadalcanal, Solomon Is., Mar. 1944, Berg.

DISTRIBUTION: Caroline Is. (Ponape, Mokil), Solomon Is.

50. Liodrosophila trukana Wheeler and Takada, n. sp. (fig. 21, *f-i*).

As shown in figure 21, penis of *trukana* is apically large; anterior gonapophysis is short and blunt; lower margin of genital arch is elongated ventrally and pointed; and bridge (decasternum) between claspers is of a different shape from that of *nana*.

Holotype, male (US 67357), Mt. Unibot, Ton I., Truk, 200 m., Jan. 1, 1953, Gressitt, allotype, female (BISHOP 3607), same data as type but Dec.

30, 1952. Paratypes: Four, same data as holotype; two (US, BISHOP), Tonoas (Dublon), Truk, 300-360 m., May 28, 1946, Townes.

DISTRIBUTION: Caroline Is. (Truk).

This species is so similar to *nana* that we have found no external characters for their separation. The male genitalia of the two differ in several respects, however, and we have no doubt that two species are involved.

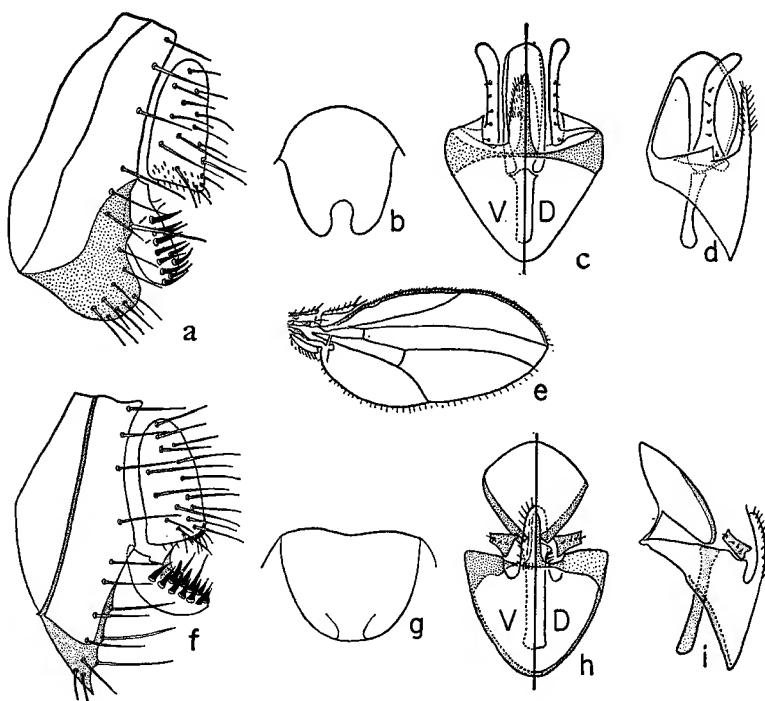


FIGURE 21.—a-e, *Liodrosophila nana*, male genitalia and wing; f-i, *L. trukana*, male genitalia. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

51. *Liodrosophila* species a.

Arista 5/3; depressed lines between orbits and frontal triangle not especially dull; face and antennae tan; carina low, absent below; palpi black, rather large. *Mesonotum* with bluish reflection; acrostichal hairs about six-rowed. *Pleura* dark brown on upper half, all pale below. Legs pale; knob of halteres dark.

Abdomen shiny; four basal tergites paler dorsally, dark laterally, remaining tergites dark; anal plates and ovipositor yellow. *Wings* hyaline; C-index about 1.0; 4-index about 2.1; C3 fringe on basal two-thirds. Body length 1.8 mm.

DISTRIBUTION: Caroline Is.

KUSAIE. Female, Mt. Tafeayat, 300-360 m., Aug. 1946, Townes.

52. *Liodrosophila* species b.

Arista 5/2; anterior reclinate orbital minute; frons with brilliant bluish, subquadrate plate, clearly separated by dull lines from narrow orbits; postverticals minute. Antennae and face tan; carina narrow above, absent below; lower face and cheeks shiny. *Mesonotum* mirrorlike, tan in front, becoming darker behind and with bluish reflections. Acrostichal hairs thin, sparse, in two rows; anterior dorsocentrals rather far forward. Scutellum velvety black; basal bristles two-fifths length of apicals. Pleura tan, shiny, with an irregular brownish stripe across upper sternopleura reaching to haltere base; halteres pale.

Abdomen black, first two tergites and a median basal area of third with dull pollen, remainder of abdomen highly polished. *Wings* hyaline; C-index about 1.4; 4-index about 1.7; C3 fringe on basal three-fifths. Body length 2.2 mm.

DISTRIBUTION: Caroline Is.

PALAU. NGAIANG: Female, June 1957, Sabrosky.

Genus *Leucophenga* Mik

Leucophenga Mik, 1886, Wiener Ent. Zeitung 5: 317 (type: *Drosophila maculata* Dufour; Europe).—Duda, 1924, Archiv Naturgesch. A, 90 (3): 185.

Arista plumose, with numerous branches; carina low or absent; postvertical bristles small; acrostichal hairs in numerous rows; strong prescutellars present; basal scutellars long, divergent; all three orbital bristles strong, posterior reclinate typically nearer to inner vertical than to proclinate; costa reaching only to apex of third vein; fourth vein often weak; third costal section armed with a sparse row of minute thorn-like spines. Fungivorous species.

This is the second largest genus in the family, with well over 100 described species. A number of subgenera have been proposed, but only two of them seem deserving of recognition: *Neoleucophenga* Oldenberg and *Paraleucophenga* Hendel (*Trichiasiphenga* Duda is a synonym since both have the same type species, *P. triseta* Hendel being a synonym of *Helomyza invicta* Walker; *teste* Hennig, 1941, Ent. Beihefte 8: 150). All Micronesian species belong to the typical subgenus.

Species identification is unusually difficult owing to the extreme degree of sexual dimorphism, plus variation, often encountered, involving palpal size and color, mesonotal and scutellar color, haltere color, and abdominal pattern. Correlating the sexes correctly is usually circumstantial, since rearing the progeny from single females has so far been impossible, and we believe that males and females have not infrequently been described as distinct species. Two examples of this situation are discussed below.

KEY TO MICRONESIAN SPECIES OF LEUCOPHENGA

1. Wings clear, without noticeable darkened areas..... 3
- Wings conspicuously darkened, or with prominent basal stripe..... 2
- 2(1). Wing with basal, diagonal, dark-brown stripe; mesonotum and basal tergites of male with strong silvery pruinosity; mesonotum of female usually not silvery, but with some faint brownish longitudinal stripes; scutellum unicolorous 56. *subpollinosa*
- Wing diffusely brown over anterior half, along fourth vein to and including posterior cross vein, and on last section of fifth vein; not silvery pruinosite; apex of scutellum whitish..... (female) 55. *limbipennis*
- 3(1). Knob of haltere black on upper side; ocellars reduced..... 4
- Halteres all pale; ocellars normal..... 5
- 4(3). Mesonotum, scutellum, and more or less of abdomen strongly silvery pruinosite; ocellars minute..... (male) 53. *argentata*
- Mesonotum and scutellum tan, not silvery; ocellars thin but evident..... (female; ? = *argentata*) 54. *halteropunctata*
- 5(3). Pleura entirely pale below notopleural suture..... 8
- Pleura with some darker-brown markings..... 6
- 6(5). Sternopleura pale; upper pleura with brown band or rounded area..... 7
- Upper sternopleura brown; another brownish area from hypopleura to metanotum 60. *species a*
- 7(6). Pleura with broad stripe from base of first coxa to base of haltere; abdomen of both sexes with pattern of black areas on tan background..... 58. *boninensis*
- Mesopleura with large, rounded, brownish area; male abdomen mostly velvety black, female abdomen with pattern..... 59. *ponapensis*
- 8(5). Abdomen black, usually velvety..... (male) 57. *nigriventris*
- Abdomen with pattern of dark and light areas..... (female; ? = *guttiventris*) 57. *nigriventris*

53. *Leucophenga argentata* (de Meijere). (Figure 22, a-d).

Drosophila argentata de Meijere, 1914, Tijdschr. Ent. 57: 258 (Java; type in Amsterdam).

Leucophenga argentata, Duda, 1924, Archiv Naturgesch. A, 90 (3): 188, 238.—Sturtevant, 1927, Philippine Jour. Sci. 32: 364.

? *Leucophenga halteropunctata* Duda, 1924, Archiv Naturgesch. A, 90 (3): 188, 239 (possibly female of *argentata*).

Male: *Arista* about 6/3; proclinate and anterior reclinate orbita subequal, three-fourths length of posterior reclinate, and with their bases at nearly the same level. Ocellars minute; frons narrow, pale yellowish white. Antennae and face whitish; cheeks pale, linear; palpi pale or with apex a little darker, club-shaped, with a stout subapical bristle and several smaller ones proximally. *Mesonotum* pale yellowish, covered with dense silvery pruinosity; pleura pale, a little silvery; scutellum strongly silvery. Legs pale, knees sometimes a little darkened. Knob of haltere with a definite round black mark on upper outer side.

Abdomen yellowish white, somewhat silvery, with prominent black marks, pattern somewhat variable. Average pattern on Micronesian specimens: tergite 3 with narrow stripe at extreme lateral margins (not seen from above), tergite 4 with five large marks, tergite 5 with a narrow median mark, and tergite 6 with a small lateral mark on each side, often not seen because of telescoping of segments. There is sometimes a small median mark on tergite 3, and there may be five small marks on tergite 5. *Wings*

hyaline, first vein a little darkened just before apex; C-index about 1.8; 4-index about 2.2; C3 fringe on basal two-thirds. Body length up to 2.5 mm.

DISTRIBUTION: Java, Taiwan, Philippine Is., Caroline Is.

PALAU. KOROR: Eight, May 1957, Sabrosky; one, Jan. 1953, one, May 1953, Beardsley; one, 25 m., Dec. 1952, Gressitt. BABELTHUAP: One, Melekeiok, one, Ngaremlengui, May-June 1957, Sabrosky; one, Ngiwal, Dec. 1952, Gressitt.

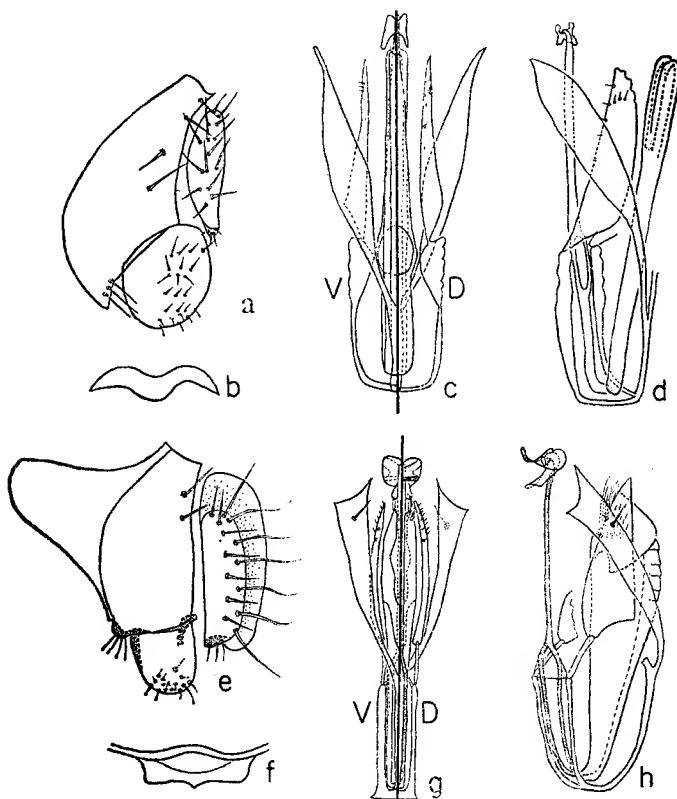


FIGURE 22.—Male genitalia: a-d, *Leucophenga argentata*; e-h, *L. nigriventris*. (Shown are genital arch, bridge connecting two sides of arch, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

All 15 Micronesian specimens of *argentata* are males, and it appears from the literature that only the male is known. We believe that the female is *halteropunctata* (discussed below) of which we have five specimens, all females, taken at the same times and places as 10 of the *argentata* males. Both have the same arrangement of orbita, reduced ocellars, the same haltere

marking, similar wings, and other characters. Duda [1924, Archiv Naturgesch. A, 90 (3) : 239] cited a male that he thought belonged with *halteropunctata* females; this male (headless) had a strongly silvery mesonotum and scutellum, as does *argentata*; he indicated that the scutellar markings were like those of *halteropunctata* (blackish around bases of basal scutellars, whitish apex), but this feature is not present on any of our specimens.

54. *Leucophenga halteropunctata* Duda.

Leucophenga halteropunctata Duda, 1924, Archiv Naturgesch. A, 90 (3) : 188, 239 (Formosa; type in Deutsch. Ent. Mus., Berlin); 1923, Mus. Nat. Hungarici, Ann. 20:28 (*nomen nudum*).—Sturtevant, 1927, Philippine Jour. Sci. 32: 364.—Burla, 1954, Rev. Suisse Zool. 61: 29.
? *Leucophenga argentata* (de Meijere), 1914, Tijdschr. Ent. 57: 258 (possibly male of *halteropunctata*).

Female: *Arista* 6-7/3; orbital bristles as in *argentata*, but frons a little wide, ocellars a little larger, and antennae and face not so whitish. Palpi usually a little brownish apically. *Mesonotum* tan to dark tan, scutellum mostly of same color but apex broadly whitened and with black regions around bases of basal scutellars. Pleura and legs yellow. Knob of haltere with dorsal black mark as in *argentata*.

Abdomen tan with a pattern of dark areas: tergite 2 with lateral marks, 3 with median and lateral marks, 4 with five large black marks, 5 with five smaller marks, 6 with lateral marks. *Wings* hyaline, first vein a little darkened just before apex. C-index about 1.7; 4-index 2.5-2.8; C3 fringe on basal two-thirds. Body length up to 2.8 mm.

DISTRIBUTION: Taiwan, Philippine Is., Africa, Caroline Is.

PALAU. KOROR: One, Mar. 1957, Sabrosky. **BABELTHUAP**: Two, Ngaremlengui, one, Ngiwal, one, Airai, Ngarsung, May-June 1957, Sabrosky.

All five specimens are females, and we believe that they may represent the female of *argentata* (see discussion above).

55. *Leucophenga limbipennis* (de Meijere).

Drosophila limbipennis de Meijere, 1908, Tijdschr. Ent. 51: 156 (Java; type in Amsterdam).

Leucophenga limbipennis, Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 27; 1924, Archiv Naturgesch. A, 90 (3) : 186, fig. 21 (wing).

Female: *Arista* 7/3; proclinate orbital five-sixths length of anterior reclinate, placed well in front of the latter; ocellars long. Frons tan, moderately narrow; antennae tan. Palpi black, large, flat, and with a few short, thin bristles. *Mesonotum* dark tan, scutellum mostly darker tan but with apex broadly whitish. Halteres pale. Pleura tan, with a diffuse brownish area on mesopleura. Legs pale.

Abdomen mostly subshiny black, with a few pale regions: tergites 2 and 3 pale basally, dark apical band on 2 broader at sides; tergites 4 and 5 all black, 6 black at sides, pale in middle. *Wings* brown, more intensely so along anterior portion and along fourth vein between cross veins, over posterior cross vein, and along last section of fifth vein. C-index 1.9; 4-index 2.5; C3 fringe on basal two-thirds. Body length 2.1 mm.

DISTRIBUTION: Java, Taiwan, Malaya, Caroline Is.

TRUK. TONOAS (Dublon): One, 300-360 m., May 1946, Townes.

As this single specimen is damaged, the identification is somewhat uncertain.

56. *Leucophenga subpollinosa* (de Meijere). (Figure 23, *a-d.*)

Drosophila subpollinosa de Meijere, 1914, Tijdschr. Ent. 57: 263 (Indochina; type in Amsterdam).

Leucophenga subpollinosa, Duda, 1923, Mus. Nat. Hungarici, Ann. 20: 28; 1924, Archiv Naturgesch. A, 90 (3): 186-187, fig. 23 (wing); 1926, Suppl. Ent. 14: 52; 1939, Mus. Nat. Hungarici, Ann. 32: 42.—Okada, 1956, Syst. Study Dros. Japan, 30.

Male: *Arista* 7/2; proclinate orbital and anterior reclinate subequal, latter well behind former; ocellars long. Frons whitish yellow, rather narrow, silvery when viewed from certain angles. Antennae, face, and palpi pale; cheeks pale, linear. *Mesonotum* and scutellum light tan, covered with dense silvery pollinosity. Pleura with a brownish band from near base of first coxa to base of haltere; knob of haltere black. Legs pale.

Abdominal pattern not well preserved; apparently tergites 1 to 3 are pale, 4 has an apical dark band, medianly expanded, and the remainder of abdomen is black. The paler abdominal areas are somewhat silvery when viewed from certain angles. *Wing* with a prominent diagonal dark stripe near base; costa black; C-index 1.9-2.0; 4-index about 3.0; C3 fringe not well defined, but seems to reach or nearly reach third vein. Body length 2.0 mm.

Female: Similar to male but lacking silvery pollinosity and with blacker abdomen. Frons wider than on male; palpi a little brown at apex; mesonotum tan with diffuse, narrow brown longitudinal stripe in each dorsocentral row, and with two broader grayish to whitish pollinose bands anteriorly between brown ones. Abdomen subshining black, basal one or two segments sometimes paler; body length up to 2.2 mm.

DISTRIBUTION: Indonesia, Taiwan, Japan, Africa, Caroline Is.

PALAU. KOROR: Four, Mar.-May 1957, Sabrosky.

57. *Leucophenga nigriventris* (Macquart). (Figure 22, *e-h.*)

Drosophila nigriventris Macquart, 1843, Dipt. exot. 2 (3): 259 (Cochin China; type unknown).—de Meijere, 1908, Tijdschr. Ent. 51: 158.

Leucophenga nigriventris, Duda, 1924, Archiv Naturgesch. A, 90 (3): 188.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. 204: 95.

? *Leucophenga guttiventris* (de Meijere), 1908, Tijdschr. Ent. 51: 331 (Java; nom. nov. for *Drosophila maculiventris* de Meijere, 1908, Tijdschr. Ent. 51: 155, nec van der Wulp, 1897).—Okada, 1956, Syst. Study Dros. Japan, 27 (possibly female of *nigriventris*).

Male: *Arista* 7/3; anterior reclinate orbital behind proclinate, about four-fifths length; ocellars strong. Frons tan, moderately narrow; antennae tan, segment 3 a little darker; face tan; cheeks linear, discolored. Palpi dark brown, club-shaped, bristled along lower edge. *Mesonotum* and scutellum tan; pleura more yellowish; legs pale, knees often darkened. Halteres pale.

Abdomen black, usually velvety, basal one or two segments sometimes with pale areas basally and at sides. *Wings* hyaline, veins rather dark. C-index about 2.0; 4-index about 2.2; C3 fringe on basal two-thirds. Body length up to 2.5 mm.

and cheeks pale. Palpi dark brown, a little broader than is usual in males, flat, with a row of long bristles along lower edge. *Mesonotum* and scutellum dark tan; pleura with a broad brown stripe from base of first coxa to haltere base, otherwise pale. Halteres pale. Legs pale, knees darkened.

Abdomen tan with subshining black areas: tergite 2 with large lateral bands, sometimes united in midline to form a complete apical band; 3 with lateral marks, with or without a small median one; 4 with a large median mark and a very large lateral one on each side; 5 and 6 with lateral marks, 5 rarely with a small median one. *Wings* hyaline, veins dark; C-index about 1.7; 4-index about 1.8; C3 fringe on basal three-fifths. Body length up to 2.5 mm.

Female: As the male except for palpi and abdominal pattern. Palpi black, large and flat, bristles small. Tergite 2 with extensive black apical band; 3 with three to five black areas which are often more or less fused with one another; 4 with a large median mark and very large lateral marks; 5 with small median and large lateral marks; 6 with lateral marks. Body length to 3.5 mm.

Holotype, male (US 67358), Okimura, Haha Jima, Bonin Is., Apr. 26-May 9, 1958, Snyder; allotype, female (US), Ani Jima, Chichi Jima, Bonin Is., May 17, 1958, Snyder; and 73 additional specimens, 40 of which are labeled paratypes (BISHOP, US, CAS): Bonin Is.: Camp Beach, Omura, Chichi Jima, Apr. 2-25, 1958; Ogiura, Chichi Jima, Apr. 8, May 12, 1958; Yankee Town, Okumura, Chichi Jima, May 12-June 9, 1958; General's Beach, Yatsuse R., Chichi Jima, Apr. 10-22, 1958; Bull Beach, Sakai-ura, Chichi Jima, May 12-31, 1958; Kammuri-iwa (SW Bay), Ototo Jima, Chichi Jima, June 3, 1958; Nishi Jima, May 22, 1958; Sen-zan (NE Bay), Ani Jima, May 28, 1958; Southwest Bay, Ani Jima, May 17, 1958; Okimura, Haha Jima, Apr. 6, 1958, Apr. 26-May 9, 1958, all Snyder; one, Chichi Jima, July 10, 1951, R. M. Bohart. Nimitz Hill, Guam, S. Mariana Is., five, May 4, 1956, C. F. Clagg.

DISTRIBUTION: Bonin Is. (Chichi Jima, Haha Jima), S. Mariana Is. (Guam).

59. *Leucophenga ponapensis* Wheeler and Takada, n. sp. (fig. 23, *i-l*).

Male, female: *Arista* 5/2; anterior reclinate orbital a little behind proclinate and a trifle shorter; ocellars strong. Frons tan, on males darker brown when seen from certain angles, on females more whitish pollinose. Antennae tan, segment 3 darker; face and cheeks tan. Palpi black, those of males club-shaped, of females large, broad and flat. *Mesonotum* and scutellum tan; pleura yellowish, with a rather rounded dull brownish mark on mesopleura, more prominent on females. Halteres pale; legs pale, knees a little darkened.

Male *abdomen* black, velvety, basal tergites a little paler basally. Female abdominal pattern difficult to determine due to shrinkage; from the side, tergites 2 and 3 are pale laterally, the rest black; from above, tergites seem mostly subshining black, tergite 3 with evidences of paramedian basal pale regions, and 5 mostly yellowish but with a small median blackish region. *Wings* slightly darkened; C-index about 2.5; 4-index about 2.0; C3 fringe on basal three-fifths. Body length 2.2 mm.

Holotype, male (US 67359) and one paratype, male (MCZ), Agric. Expt. Sta., Ponape, June-Sept. 1950, Adams; allotype, female (TEX), Colonia, Ponape, Aug. 1956, Wheeler; one paratype, female, Colonia, Ponape, July-

Aug. 1959, Wheeler and Wasserman; one paratype, male (BISHOP), Agric. Expt. Sta., Ponape, Jan. 6, 1953, Gressitt.

DISTRIBUTION: Caroline Is. (Ponape).

60. **Leucophenga** species a.

Female ?: *Arista* about 7/4; anterior reclinate orbital behind proclinate, the two subequal; ocellars strong. Frons yellow with thin whitish pollinosity. Antennae, face, and cheeks pale. Palpi dark tan, club shaped, bristled below. *Mesonotum* dark tan; scutellum mostly darker, apex broadly whitish. Pleura diffusely dark brown on upper sternopleura and lower hypopleura, color extending to metanotum. Halteres and legs pale. *Abdomen* twisted and shrunken; tergite 2 (3?) with small median and larger lateral dark marks; following one with broad apical black band, much broader in midline. *Wings* apparently hyaline; C-index 2.7; 4-index 1.2. Body length about 3.8 mm.

DISTRIBUTION: S. Mariana Is.

S. MARIANA IS. GUAM: One, Pt. Oca, May 1945, Bohart and Gressitt.

The single specimen is so poorly preserved that identification is not possible; it agrees moderately well, however, with *albiceps* de Meijere from Java (1914, *Tijdschr. Ent.* 57: 258, as *Drosophila*) and also seems similar to *cincta* de Meijere from Java (1911, *op. cit.* 54: 395, as *Drosophila*).

Genus **Stegana** Meigen

Stegana Meigen, 1830, *Syst. Beschreib.* 5: 79 (type: *S. nigra* Meigen = *Drosophila curvipennis* Fallén; Europe).

Protostegana Hendel, 1920, *Wiener Ent. Zeitung* 38: 52 (type: *Drosophila curvipennis* Fallén; Europe).

Arista plumose; face flat below; postvertical bristles small; acrostichal hairs numerous; prescutellars strong; scutellum large, flattened; basal scutellars divergent; middle tibia with a row of stout bristles along outer side; wings dark; third and fourth veins usually convergent apically; wing with a distinct fold or crease just beyond posterior cross vein, paralleling last section of fifth vein.

KEY TO MICRONESIAN SPECIES OF STEGANA

Fore tibia all dark, middle and hind tibiae with basal and apical dark bands; basitarsi darkened; sternopleura with an isolated brown area above....61. **ornatipes**
All tibiae with basal and apical bands; basitarsi pale; sternopleura pale....62. **species a**

61. **Stegana ornatipes** Wheeler and Takada, n. sp. (fig. 24, *a-d*).

Arista about 8/7, apex usually tripartite; secondary branches (along inner side of axis) rather prominent. Anterior reclinate orbital three-fourths length of proclinate, space between their bases half that between anterior and posterior reclinate. Frons twice as long as its width at level of proclinate orbital; subshining; a dark brown streak near lunule, behind this paler tan, then darker brown over remainder except for a paler median line. Eye subquadrate as seen in profile, height and length nearly equal. Antennal segment 2 tan, 3 black; upper face lowly carinate, black; below this face is

pale except for a narrow black transverse stripe on oral margin; clypeus and palpi black. Cheek yellow to whitish, moderately narrow; vibrissa single, long.

Mesonotum chestnut brown, subshining; scutellum darker brown; notopleural and humeral areas darker, but humerus bounded by pale yellow in front and below. Upper pleura with a broad, black longitudinal stripe; sternopleura with a small brownish area, more prominent on females; pleura otherwise pale. Halteres pale. Legs with pattern of dark marks; on first leg, apex of femur, all of tibia, and basitarsus are blackish; on other legs blackish areas are on femora apically, near base and apex of tibiae, and on basitarsi. *Abdomen* light brown, rather shiny. *Wings* dark brown; second vein weakly undulating; distance between apices of third and fourth veins slightly less than length of anterior cross vein; C-index about 1.8; 4-index about 1.7; C3 fringe not well developed. Body length up to 3.0 mm.

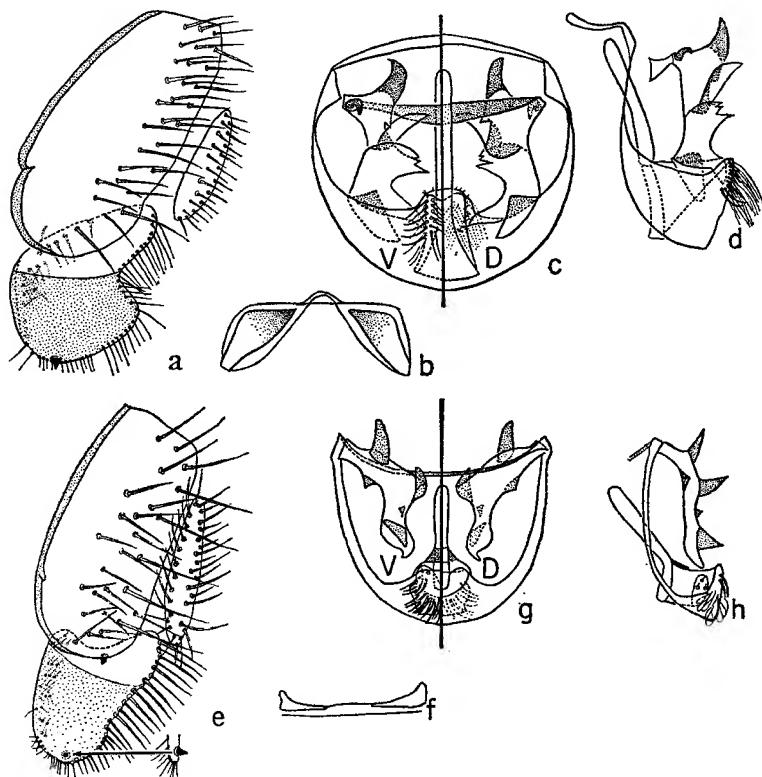


FIGURE 24.—Male genitalia: a-d, *Stegana ornatipes*; e-h, *S. species a*. (Shown are genital arch and clasper, bridge connecting claspers, and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

Holotype, male (KU), Lele, Kusaie (Ualan) I., Dec. 12, 1937, Esaki; allotype, female (US 67360), Mt. Tafeayat, Kusaie, 240-360 m., Aug. 21, 1946,

Townes. Eight paratypes (BISHOP, KU) : two, same data as holotype, two, Malem, Kusaie, Dec. 16, 1937, Esaki; four (US), same data as allotype.

DISTRIBUTION : Caroline Is. (Kusaie).

62. *Stegana* species a (fig. 24, e-h).

Pleura pale except for broad upper stripe; tarsi all pale; all femora seem to be darkened apically, and all tibiae have basal and apical dark bands, the pattern much stronger on middle legs. C-index 2.0; 4-index 2.0; wings more strongly darkened anteriorly, but the specimen appears to be teneral and probably does not show mature coloration.

DISTRIBUTION : Caroline Is.

PALAU. NGARMALK (NW. Auluptagel) : Male, 25 m., light trap, Dec. 1952, Gressitt.

The single specimen is in poor condition but appears to be quite similar to *ornatipes*.

Genus *Cacoxenus* Loew

Cacoxenus Loew, 1858, Wiener Ent. Monatschr. 2: 216 (type: *C. indagator* Loew; Europe).—Duda, 1924, Archiv Naturgesch. A, 90 (3) : 225—Hardy and Wheeler, 1960, Ent. Soc. Am., Ann. 53 : 356.

Arista bare to pubescent; postverticals small; posterior reclinate orbital closer to inner vertical than to proclinate; prescutellars strong; basal scutellars divergent; sutural bristle small; vibrissa single; cheeks narrow.

63. *Cacoxenus lepidothrix* Wheeler and Takada, n. sp. (fig. 25).

Arista micropubescent, as long as median frontal length; proclinate orbital bristle-like, somewhat convergent; anterior and posterior reclinate orbita modified into thin, black scales (fig. 25, a-d); a small bristle between proclinate and anterior reclinate. Ocelli on a raised mound; ocellar bristles strong; inner vertical shorter than outer one. Frons dull, mostly blackish gray, becoming tan in front; a dark spot at base of proclinate orbital. Antennal segment 2 tan, 3 a little darker. Face slightly carinate above, yellowish above becoming gray below; clypeus dark gray; cheeks tan; palpi tan.

Mesonotum dull, gray to grayish brown; acrostichal hairs in about 10 rows; anterior dorsocentrals and prescutellars subequal. Scutellum dull, more yellowish gray than mesonotum; basal scutellars half length of apicals. Pleura dull grayish brown, pollinosity variable in intensity from area to area, giving a splotchy appearance. Two strong sternopleurals. Legs banded; all femora with blackish band, strongest on first leg; tibiae with two black bands; tarsi tan. *Abdomen* mostly brown, tergites with narrow apical and basal yellowish areas; tergites 1 and 2 broadly yellowish in middle.

Wings clear; veins one, two, and three dark, the rest paler; vein four exceedingly weak beyond posterior cross vein; costa reaching only to apex of third vein. C-index 1.2; 4-index about 2.5; C3 fringe not well differentiated, apparently on basal two-thirds. Body length about 1.5-2.0 mm.

Holotype, male (US 67361), Melekeiok, Babelthuap, Palau Is., May 23, 1957, Sabrosky. Two paratypes (BISHOP, TEX) (one male, one without abdomen), Koror, Palau Is., Mar. 29, 1953, Beardsley.

DISTRIBUTION : Caroline Is. (Palau).

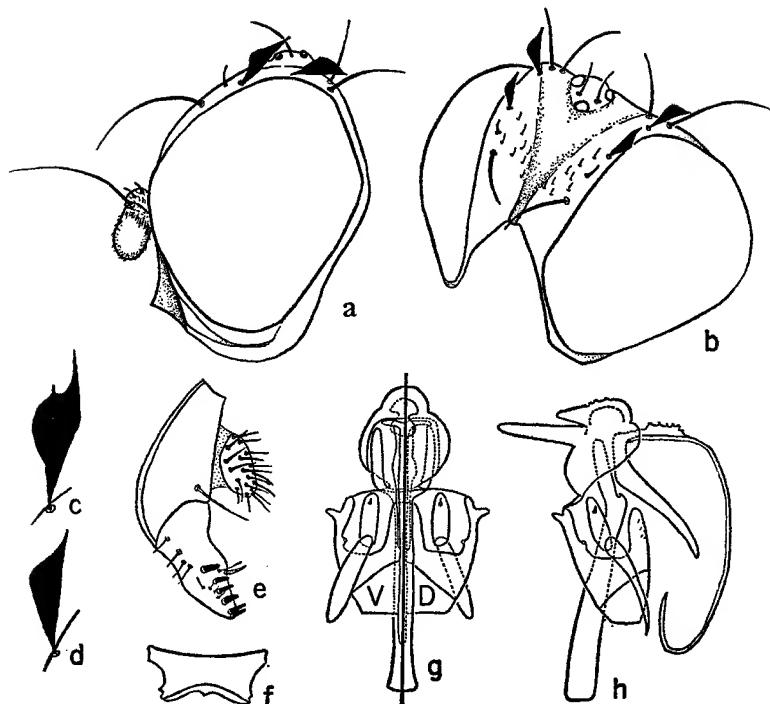


FIGURE 25.—*Cacoxenus lepidothrix*: a, male head, profile; b, male head, semidorsal view; c, d, detail of posterior and anterior reclinate orbitals; e, genital arch and clasper; f, bridge; g, copulatory apparatus in ventral (V), and dorsal (D) views; h, same, lateral view.

Genus *Calodrosophila*, new genus

Arista plumose; orbita thin, far apart, anterior reclinate small; postverticals rather small; ocellars located outside ocellar triangle, beside anterior ocellus; frons flat; face slightly carinate above; two pairs of dorsocentrals, anterior ones short, near posterior; no prescutellars; acrostichals in four irregular rows; C-index low.

Type: *Calodrosophila phalerosa* Wheeler and Takada, new species.

Range: Caroline Is. (Palau, Yap).

64. *Calodrosophila phalerosa* Wheeler and Takada, n. sp. (fig. 26, a-h).

Arista 3/2, rarely 4/2; anterior reclinate orbital thin, about one-fifth length of other two; posterior reclinate midway between proclinate and inner vertical. Frons quite flat, yellowish on sides and anteriorly, more grayish centrally. Antennal segment 2 and upper basal part of 3 yellowish white, rest of 3 brown. Face nearly flat, pale above, becoming discolored below, especially around vibrissa; clypeus dark gray pollinose. Cheeks linear; vibrissa single; palpi dark brown.

Mesonotum dull, dark brown except for a strikingly whitish-gray pollinose central stripe which covers area between dorsocentral rows, gradually narrowing behind as it reaches scutellum. Scutellum dark brown to black, somewhat velvety; basal scutellars convergent, nearly as long as apicals. Acrostichal hairs sparse, in four irregular rows; anterior dorsocentrals thin, about half length of posterior. Pleura dull dark brown, sutures paler, especially that along ventral edge of mesopleura. One long and

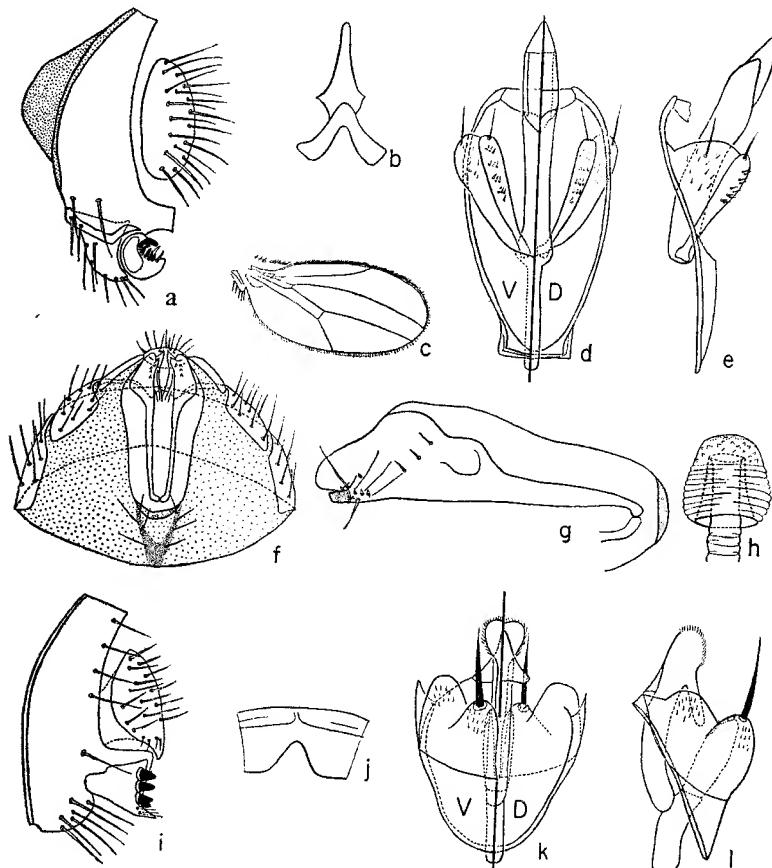


FIGURE 26.—a-h, *Calodrosophila phalerosa*; i-l, *Nesiodrosophila lindae* (a, i, genital arch and clasper; b, j, bridge; d, k, copulatory apparatus in ventral (V) and dorsal (D) views; e, l, same, lateral view; c, wing; f, tip of female abdomen, ventral view; g, ovipositor, lateral view; h, inner sclerotized capsule of spermatheca).

one short sternopleural. Coxae and femora brown, tibiae and tarsi more yellowish. Halteres pale.

Abdomen subshining, tergites with broad apical bands, medially interrupted, bases also more yellowish; interruptions become gradually smaller posteriorly so that last tergites are all brown. *Wings* clear, veins dark. C-index about 0.8; 4-index about 2.4; C3 fringe on basal three-fifths. Body length of female up to 2.0 mm.

Holotype, male (US 67362), Ngerehelong, Babelthuap, Palau Is., along stream, May 7, 1957, Sabrosky; allotype, female (US), E. Ngatpang, Babelthuap, Palau Is., 65 m., Dec. 16, 1952, Gressitt. Paratypes (US, BISHOP): 19, NW. Auluptagel, Palau Is., 25 m., Dec. 12, 13, 1952, light trap, Gressitt; one, Auluptagel, Sept. 1952, Krauss. One specimen, Yap I., Yap, Oct. 1952, Krauss, is paler than the type series, especially on pleura, legs, and abdomen, but the male genitalia agrees completely with that of the Palau specimens.

DISTRIBUTION: Caroline Is. (Palau, Yap).

Genus *Nesiodrosophila*, new genus

Small species; arista plumose; anterior reclinate orbital large, beside proclinate; ocellars outside ocellar triangle; face flat; second oral bristle developed; acrostichal hairs irregular, in four to six rows; no prescutellars; anal vein weak.

Type: *Nesiodrosophila lindae* Wheeler and Takada, new species.

Range: Caroline Is. (Palau).

65. *Nesiodrosophila lindae* Wheeler and Takada, n. sp. (fig. 26, *i-l*).

Male, female: Arista 5/2; frons tan, as broad as long, subshining; anterior reclinate orbital nearly as large as proclinate, beside it, the two placed rather far forward on frons; posterior reclinate larger. Antennae, face, and cheeks pale tan; clypeus and palpi dark brown. Second oral bristle half length of first, both rather stout. Cheeks moderately narrow.

Mesonotum and scutellum dull tan; pleura tan with two prominent dark-brown longitudinal stripes, one from base of fore coxa, over upper mesopleura, to haltere base, and one across upper part of sternopleura. Halteres tan. Legs pale; male tarsi unusually bristly. *Abdomen* dull tan, each segment with a darker brown apical band. *Wings* hyaline, veins brown; C-index about 1.7; 4-index about 3.2; C3 fringe on basal three-fifths; last section of fifth vein about five times as long as posterior cross vein. Body length about 1.3 mm.

Holotype, male (US 67363), Aimeliik, Netkeng, Babelthuap, Palau Is., May 6, 1957, Sabrosky; allotype, female (US), Malakal I., Palau Is., May 17, 1957, Sabrosky. Paratypes (US, BISHOP, CM): 11, E. Ngatpang, Babelthuap, Palau Is., alt. 65 m., light trap, Dec. 6, 10, 1952, Gressitt; four, NW. Auluptagel, Palau Is., alt. 25 m., light trap, Dec. 12, 13, 1952, Gressitt; one, wooded valley west of Ulimang, Babelthuap, Dec. 21, 1947, Dybas.

DISTRIBUTION: Caroline Is. (Palau).

Genus *Baeodrosophila*, new genus

Minute species, 1.0-1.5 mm. long; arista wholly pubescent or with a few branches and with main axis pubescent at apex; ocellars usually outside ocellar triangle; anterior reclinate orbital small; face carinate; acrostichal hairs in eight straight rows; weak prescutellars sometimes present; basal scutellars divergent; anal vein absent; costa reaching apex of fourth vein.

Type: *Baeodrosophila pubescens* Wheeler and Takada, new species.

Range: Mariana Is., Caroline Is.

Of the previously described genera, *Baeodrosophila* seems most like *Drosophilella* Duda (1923, Mus. Nat. Hungarici, Ann. 20: 25) in which he placed the type species *D. seminigra* Duda (New Guinea) and *D. colocasiae* Duda (Java; inadvertently later redescribed in the genus *Drosophila*). Characters cited for *Drosophilella* which are essentially in agreement with *Baeodrosophila* are: small body size; pubescent arista; large carina; frons with small bristles; ocellars present; wings colorless. However, both species are described as having a shining mesonotum, acrostichal hairs in four or six rows, anterior dorsocentrals located anteriorly near transverse suture, and the arista never with branches. We have seen the two female types of *colocasiae* (from Mus. Amsterdam); the second tarsal segment of the fore leg has a strange toothed protuberance, not mentioned by Duda. We believe, therefore, that the two genera are distinct, although probably related.

KEY TO MICRONESIAN SPECIES OF BAEODROSOPHILA

1. Arista entirely pubescent, without branches.....	67. pubescens
Arista with some dorsal and ventral branches, only apex of main axis pubescent	2
2. Mesonotum and scutellum dark brownish black, strongly contrasting with pale pleura and abdomen.....	69. bicolor
Mesonotum less strongly colored, margins paler; scutellum pale, at least on edges	3
3. Arista usually with three evident dorsal branches; mesonotum mostly tan, becoming gradually darker anteriorly only.....	68. discolor
Arista typically with two dorsal branches; mesonotum with brownish band between dorsocentral rows, reaching onto scutellum.....	66. pallens

66. *Baeodrosophila pallens* Wheeler and Takada, n. sp. (figs. 27, b; 28, a-d).

Arista (fig. 27, b) typically with two dorsal branches and one ventral branch, apex of main axis micropubescent (visible only with high magnification). Proclinate and posterior reclinate orbita subequal, pale; anterior reclinate small. Frons a trifle wider than long, dull yellowish tan, ocellar area darker gray. Ocellars beside anterior ocellus. Antennae, face, cheeks, proboscis, and palpi pale yellowish. Carina large, broad; cheeks rather broad; oral bristles pale, second nearly one-third length of first.

Mesonotum pale tan with a broad light-brownish longitudinal band which reaches back onto scutellar disc, band is rather clearly limited to region within dorsocentral rows; sides and apex of scutellum pale. Acrostichal hairs in eight straight rows; hairs in prescutellar area somewhat enlarged; anterior dorsocentral near posterior one, only one-fourth to one-fifth as long as the latter. Two humerals; two strong sternopleurals, their bases rather far apart. Pleura, halteres, and legs all pale.

Abdomen tan, without pattern. Female ovipositor large, with coarse, marginal teeth. *Wings* hyaline, veins pale; C-index about 1.2; 4-index about 2.5; C3 fringe on basal four-fifths. Body length up to 1.5 mm.

Holotype, male (US 67364), Yona, Guam, Oct. 1952, Krauss; allotype, female (US), Pt. Oca, Guam, May 23, 1945, Bohart and Gressitt. Five para-

types (US, BISHOP); two, same data as holotype; three, Afetna Pt., Saipan, June 29, 1946, Townes. Four additional specimens, tentatively identified as *pallens*: three, Ngaremlengui, Babelthuap, Palau, *Pandanus*, June 3, 1957, Sabrosky; one, South of Nanponmal, Ponape, *Pandanus*, Jan. 17, 1953, Clarke.

DISTRIBUTION: S. Mariana Is. (Saipan, Guam), Caroline Is. (Palau, Ponape).

67. *Baeodrosophila pubescens* Wheeler and Takada, n. sp. (fig. 27, a, e-k).

Arista relatively short, the main axis pubescent along its entire length, lacking branches (fig. 27, a). Proclinate and posterior reclinate orbita subequal; frons as wide as long, dull, pale tan anteriorly, darker tan behind, ocellar area, posterior orbits,

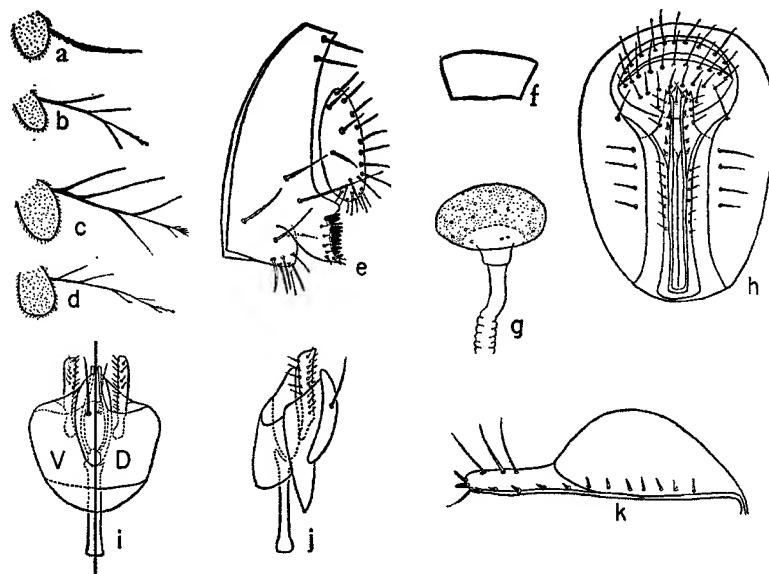


FIGURE 27.—a, e-k, *Baeodrosophila pubescens*: a, antennae; e, genital arch and clasper; f, bridge; g, inner sclerotized capsule of spermatheca; h, tip of female abdomen, ventral view; i, copulatory apparatus in ventral (V) and dorsal (D) views; j, same, lateral view; k, ovipositor, lateral view. b, *B. pallens*, antenna; c, *B. discolor*, antenna; d, *B. bicolor*, antenna.

and occiput still darker. Ocellars beside anterior ocellus or only slightly behind it. Antennae, face, cheeks, proboscis, and palpi pale. Carina large, rather flat; oral bristles pale, second scarcely one-fourth length of first.

Mesonotum more extensively brownish than on *pallens*, broad band extending well beyond dorsocentral rows and fading away irregularly on sides; scutellum broadly pale along edges, or entirely pale. Acrostichal hairs in eight rows; a pair of weak prescutellars. Pleura, legs, and halteres pale. *Abdomen* light tan to yellowish, without pattern. Female ovipositor thin, narrow at apex. *Wings* hyaline, veins pale. C-index about 1.0-1.1; 4-index about 2.6; C3 fringe on basal two-thirds. Body length 1.0-1.2 mm.

Holotype, male (US 67365), NE. Koror I., Palau Is., at light, Mar. 28, 1957, Sabrosky; allotype, female (US), Ngaremlengui, Babelthuap, Palau Is., *Pandanus*, June 3, 1957, Sabrosky. Paratypes (US, BISHOP): One, same data as holotype; six, same data as allotype; one, Imeliik, Netkeng, Babelthuap, Palau Is., June 5, 1957, Sabrosky; one, Koror, Palau, July 2, 1953, Beardsley;

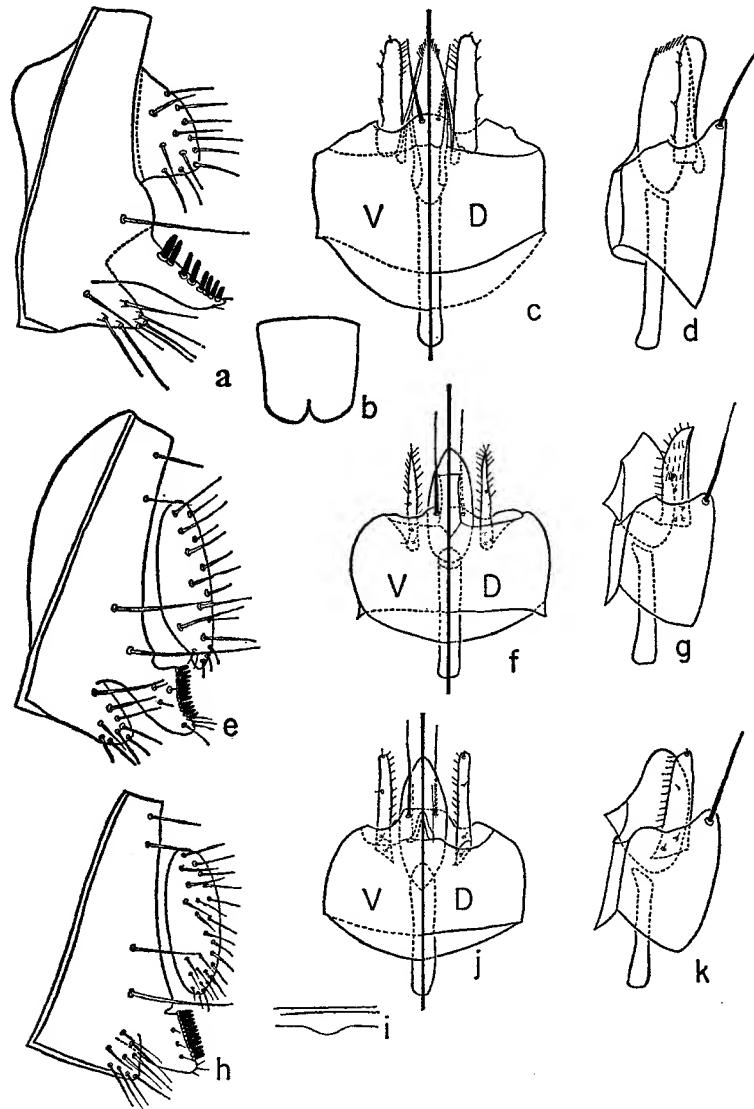


FIGURE 28.—Male genitalia: a-d, *Baeodrosophila pallens*; e-g, *B. discolor*; h-k, *B. bicolor*. (Shown are genital arch and clasper, bridge connecting claspers [except for *discolor*], and copulatory apparatus in ventral (V), dorsal (D), and lateral views.)

six, E. Ngatpang, Babelthuap, alt. 65 m., Dec. 9, 10, 1952, Gressitt; some specimens are from light traps, several are labeled *Pandanus*.

DISTRIBUTION: Caroline Is. (Palau).

68. *Baeodrosophila discolor* Wheeler and Takada, n. sp. (figs. 27, c; 28, e-g).

Arista (fig. 27, c) usually with three moderately strong dorsal branches and one ventral branch, followed by a series of small hairs of decreasing size, thus appearing as a dense pubescent cluster near apex. Proclinate orbital three-fourths length of posterior, anterior reclinate about one-third length of posterior. Frons as wide as long, dull tan, ocellar area a little darker. Ocellars beside anterior ocellus. Antennae, face, cheeks, proboscis, and palpi pale yellowish. Carina narrower and more rounded above than on *pallens* or *pubescens*. Second oral bristle only one-fifth length of first.

Mesonotum dull dirty tan, gradually becoming darker tan to tannish brown anteriorly, darkest behind head; this browner area extends laterally to humeri. Scutellum all tan. Acrostichal hairs in eight rows; a pair of weak prescutellars. Anterior dorsocentrals stronger than on other species, about one-half length of posterior ones; distance between the two dorsocentrals of one side about half that between the two rows. Pleura, halteres, and legs pale.

Abdomen pale yellowish tan, without pattern. Ovipositor thin and narrow apically. *Wings* hyaline, veins pale. C-index about 1.3; 4-index about 2.8; C3 fringe on basal four-fifths. Body length 1.5 mm.

Holotype, male (US 67366), allotype, female (US), Ngaremlengui, Babelthuap, Palau Is., *Pandanus*, June 3, 1957, Sabrosky. Paratypes (BISHOP, US): six, same data as types; one, Ngiwal, Babelthuap, at light, one, SE. Ulebsehel, Palau Is., beach, Mar.-May 1957, Sabrosky; one, Koror, at light, July 2, 1953, Beardsley.

DISTRIBUTION: Caroline Is. (Palau).

69. *Baeodrosophila bicolor* Wheeler and Takada, n. sp. (figs. 27, d; 28, h-k).

Arista usually with two dorsal branches near base (fig. 27, d), one or two shorter dorsal and one or two shorter ventral branches subapically, followed by a few pubescent hairs. Proclinate orbital as long as posterior reclinate but not so stout; anterior reclinate one-fourth as long. Frons a little longer than wide, dull tan, but orbits, large triangular ocellar area, and occiput much darker brown; ocellar bristles behind anterior ocellus, within ocellar triangle. Face, cheeks, proboscis, and palpi pale yellow. Carina as in *discolor*.

Mesonotum and entire scutellum dark brownish black, color ceasing laterally rather abruptly before humeral and notopleural areas, pleura below contrastingly pale yellow. Acrostichal hairs in eight rows; prescutellars weak; anterior dorsocentral about one-fourth length of posterior. Legs and halteres pale.

Abdomen pale yellow, without pattern. Female ovipositor thin and narrow apically. *Wings* hyaline, veins pale. C-index about 1.2; 4-index about 2.3; C3 fringe on basal two-thirds. Body length 1.5 mm.

Holotype, male (US 67367), Kolonia, Yap I., Yap, at light, June 21, 1957, Sabrosky; allotype, female (US), Kolonia, Yap I., July-Aug. 1950, Goss. Paratypes: One male (BISHOP), same data as holotype; one female, N. Yap I., July-Aug. 1950, Goss.

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